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STUART G. HIBBEN, EDITOR

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Introduction

This volume is the twenty-third in a continuing series of compilations presenting abstracts and indexes of current Antarctic literature published since 1962. A companion volume to the series, *Antarctic Bibliography; 1951–1961,* extends the coverage retrospectively.

The material has been compiled over a period of 12 months; the cut-off date for inclusion in this volume was December 1994. To provide current awareness, the abstracts have also been distributed as 12 monthly bulletins under the title *Current Antarctic Literature.* The bulletins are generated from a computerized database which is also used in producing this cumulated listing and the indexes.

The present volume contains abstracts numbered from 49,498 to 51,653; these first appeared in issues no. 257 through 268 of *Current Antarctic Literature.* The first five volumes each contained 2,000 abstracts. Thus, items 1-2,000 appeared in v. 1 (published in 1965), items 2,001-4,000 in v. 2 (1966), items 4,001-6,000 in v. 3 (1968), items 6,0018,000 in v.4 (1970), and items items 8,001-10,000 in v. 5 (1971). Volume 6 (1973) contained items 10,001-12,244, v. 7 (1974) items 12,245-14,447, v. 8 (1976) items 14,44816,899, v. 9 (1977) items 16,900-19,248, v. 10 (1979) items 19,249-21,721, v. 11 (1980) items 21,722-24,083, v. 12 (1982) items 24,08426,452, v. 13 (1983) items 24,453-28,961, v. 14 (1985) items 28,962-31,756, v. 15 (1986) items 31,757-34,660, v. 16 (1988) items 34,661-37,522, v. 17 (1989) items 37,523-40,798, v. 18 (1990) items 40,799-42,875, v. 19 (1991) items 42,876-45,062, v. 20 (1993) items 45,063-47,376, v. 21 (1994) items 47,377-49,497, and v. 22 (1995) items 49,498-51,653.

The material is arranged in sections representing thirteen subject categories (see table of contents). Items that apply to two or more categories are listed in one section only and cross-referenced at the end of the other pertinent sections. Because of this scheme of arrangement, some items dealing with the same subject (from different aspects) will be found in two different categories; e.g. some papers on marine sediments may be found in Section E (Geological Sciences), and others in J (Oceanography). Within each section, abstracts are arranged by accession number; the indexes are keyed to these numbers.

Foreign-language titles are given in English translation first, with the original title following in brackets. Transliteration of Cyrillic and romanization of oriental languages follow the Library of Congress systems. Some of the citations are followed by library call numbers, preceded by the library symbols commonly used in union catalogs.

As a rule, the abstracts are informative rather than descriptive, but no attempt is made to verify or critically evaluate the author's statements or conclusions. Author abstracts are either used unchanged or modified for the sake of brevity or conformity to guidelines adopted for this bibliography.

Four indexes are provided: (1) an author index that includes coauthors (anonymous journal articles are referred to under the journal name); (2) a subject index that occasionally extends to two levels of subheadings and contains cross-references; (3) a geographic index to names of places, stations, and geographic features as approved by the U.S. Board on Geographic Names; and (4) a grantee index to names of organizations or institutions that received financial support from the National Science Foundation for work that resulted in publications abstracted in the volume. In each index, entries are cited by a letter, indicating the subject category, followed by the accession number: for example, B–42469 refers to section B, Biological Sciences, item number 42469.

Although the majority of the publications abstracted are in the collections of the Library of Congress, many significant items were lent by or exchanged with other institutions, made available by the Office of Polar Programs of the National Science Foundation, or received as review copies or reprints directly from publishers and authors. Because they contribute to more current and complete coverage, review copies and reprints are especially valuable, and publishers and authors are encouraged to send them to the Library of Congress, Science and Technology Division, Cold Regions Bibliography Project, Washington, D.C. 20540-5582, U.S.A.

Requests for photoreproductions of documents cited in this bibliography, except material protected by copyright, should be directed to the Library of Congress, Photoduplication Service, Dept. C–177, 10 First Street SE, Washington, D.C. 20540. U.S. government or government-sponsored technical reports may, in most cases, be obtained from the National Technical Information Service, Springfield, VA 22151. For such reports, NTIS order numbers are usually included in the bibliographic citation.

Stuart G. Hibben, *Head*
Cold Regions Bibliography Project
Science and Technology Division
Library of Congress

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A. GENERAL

A-51661

U.S. antarctic activities, 1992-1993, *Antarctic journal of the United States,* 1993, 28(5), p.ix-xix.

During the 1992-93 austral summer, the U.S. Antarctic Program, funded and managed by the National Science Foundation, provided support to more than 500 researchers to conduct 120 science and technology projects in Antarctica. Research was performed at the three year-round U.S. stations, with other national antarctic programs, and aboard U.S. and foreign research ships. Two large field camps—one in Marie Byrd Land and one on the Siple Coast—were supported. Additionally, U.S. scientists worked with scientists from the United Kingdom, New Zealand, Germany, Italy, Chile and Russia. Highlights of some of the USAP projects are given, covering the following topics: under-ice volcanoes and ice streaming; fossil discoveries suggesting temperate east antarctic climate; ozone depletion and its effects; probing of cosmic beginnings; winter investigation of sea ice; new technology advances in research; environmental activities; and support operations.

A-51684

Hempel, G., ed, **Antarctic science: global concerns,** Berlin, Springer Verlag, 1994, 287p., Refs. passim. For individual papers see A-51686, A-51692, A-51693, A-51700, A-51701, B-51685, B-51691, B-51694, B-51699, E-51696, E-51697, F-51688 through F-51690, G-51698, J-51695, K-51687 or 49-1450 through 49-1461.

DLC G845.5.A54 1994

The title of this book stems from an international conference held in Bremen, Germany, in Sep. 1991 under the auspices of the Scientific Committee on Antarctic Research (SCAR). Its main objectives were to increase public awareness of the importance of antarctic science, particularly in relation to global problems, and to foster the interaction of antarctic scientists working in different disciplines. About 500 scientists, students and engineers, as well as politicians and media from all over the world attended the conference. The first 2 days of the conference were concerned with current scientific programs and results; the last 2 days addressed policy matters and the future directions of antarctic science. This volume presents revised and up-dated texts of key lectures given at the conference by some of the leading antarctic researchers, spanning a broad spectrum of antarctic science from the "ozone hole" to the microbiology of sea ice. Nevertheless, some fields are missing, e.g. geophysics of the antarctic continent, terrestrial ecology, and biology of seals, whales and birds. The main focus is on the role of Antarctica and the southern ocean in the world climate system, a topic of great importance and heated debate. (Auth. mod.)

A-51686

Drewry, D.J., **Conflicts of interest in the use of Antarctica,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.12-30, 35 refs.

DLC G845.5.A54 1994

Examples of the impact of antarctic science on political processes and the achievements obtained through scientific efforts are noted: the discovery of the ozone hole; the detection of background levels of pollution; reading the climate record stored in ice cores; and the importance of the antarctic region in global climate changes. Notwithstanding these successes, conflicts in interests have surfaced: exploitation of renewable and non-renewable natural resources; tourism; national sovereignty over portions of Antarctica; international politics; the quantity and quality of scientific output. These aspects are briefly examined.

A-51693

Zwally, H.J., **Detection of change in Antarctica,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.126-143, 38 refs.

DLC G845.5.A54 1994

Research on detection of change in Antarctica is likely to be an important part of the international program on global change. A number of important measurements and scientific studies have begun, largely as a result of the continuing research program conducted by many nations in the Antarctic as well as the interests of scientists working on antarctic science. To accomplish the desired goals of a global change detection program, conventional measurements at selected locations need to be expanded. A new emphasis on the systematic collection of well-calibrated data and the attention to these factors in the data analysis are especially important. Some of the work may require considerable efforts and may not yield much new information for some time. However, failure to commence better measurements will insure that the inability to determine current trends of key environmental parameters, due to a paucity of well-calibrated data records with adequate spatial and temporal sampling, will continue. Today's routine measurements will provide the baseline data sets for the future. (Auth.)

A-51700

Augstein, E., **Future ocean-atmosphere research in the antarctic region,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.278-282, 12 refs.

DLC G845.5.A54 1994

Set forth here is an outline of the direction and emphasis for antarctic scientific research which the author believes is necessary during the remainder of the 20th century. The primary thrust is toward topics dealing with the interrelationships between Antarctica and global climate, emphasizing the principal climate shapers: the atmosphere, the ocean, and the sea ice and ice shelves. Investigations of antarctic geophysical processes should ideally cover a wide range of time and space scales and should include all important interacting climatic elements. But in reality, individual field observations and model studies have to be limited with respect to space and time due to technical, logistic and financial restrictions as well as to the lack of experienced personnel. Consequently, international programs are needed to create joint research projects in such a way that the various single contributions may provide a satisfactory basis for reasonable syntheses.

A-51710

ANARE Club, **Aurora, Dec. 1993, Vol.13, No.2,** Melbourne, 1993, 32p.

The opening article of this issue reflects the thoughts of the person commissioned to write the history, and be involved with the production of a documentary film on the subject of the ANARE Jubilee History Project. This is followed by highlights of the conference "Living in Antarctica" and the part women played over the years in that "man's world"; a review of the events dealing with the establishment of Mawson Station in 1954; the reprint of an article published in Dec. 1953 about the activities of the Australian National Antarctic Research Expeditions Club; a collectors' corner describing and illustrating some of the French antarctic air mail stamps issued between 1949 and 1980; a biographical article on Charles Wilkes; an account of the Amery Shelf spring trip in 1963-64; and a short review of Russian aircraft in Antarctica.

A-51711

ANARE Club, **Aurora, June 1994, Vol.13, No.4,** Melbourne, 1994, 28p.

This issue contains news items concerning Australia's ratification of the Madrid Protocol; some future directions for ANARE; the Tasmania Polar Network, whose aim is to promote Hobart as a city and port well equipped to service antarctic expeditions and tourist ships; Australian radio operations at Mawson Station in 1963 and 1965; a collectors' corner describing and illustrating some of the French antarctic air mail stamps issued between 1981 and 1993; a hazardous undertaking by four expeditioners at Mawson, 40 years ago; and a list of ANARE wintering expeditioners at Wilkes Station between 1959 and 1968. The description of the first radiosonde flight at Mawson in 1955 concludes this issue.

A-51712
ANARE Club, **Aurora, Mar. 1994, Vol.13, No.3,** Melbourne, 1994, 32p.

The main feature of this issue is a narrative of the making of a film about killer whales, with photographs of whales and albatrosses in their natural habitat provided by the Australian Broadcasting Corporation Natural History Unit. Several news releases from the Antarctic Division include the departure of Australian huskies from Antarctica, the end of a six-man Australian scientific team's traverse over previously unexplored antarctic territory, and a chronological listing of most significant events that took place in 40 years of operations at Mawson Station. As part of the preparations for the ANARE Jubilee in 1997, a partial list of ANARE wintering expeditioners—at Heard I. between 1948 and 1954, and at Spit Bay in 1992—concludes this issue.

A-51713
ANARE Club, **Aurora, Sep. 1994, Vol.14, No.1,** Melbourne, 1994, 32p.

The articles and news items in this issue deal with the following: the question of whether the ANARE Club has outlived its usefulness; the changes in scientific research approach in Antarctica over the last twenty years; reminiscing about the preparation for, and the building of, Mawson Station in 1954; the use of wind energy, and removing all wastes from Antarctica, to better protect the environment; ANARE Club reports and financial statement for the years 1991-1994; and the controversy about who discovered Antarctica.

A-51714
ANARE Club, **Aurora, Dec. 1994, Vol.14, No.2,** Melbourne, 1994, 32p.

The articles and news items in this issue deal with the following: activities of the antarctic heritage special interest group; letters concerning antarctic service awards; an account of the expedition to Antarctica conducted by Captain James Clark Ross in the period 1839-1843; highlights of the earliest experiments in antarctic radio communications; the indexing of Aurora journal; book reviews; the annual report of the Cooperative Research Centre for the Antarctic and Southern Ocean Environment, 1993-1994; and a new one-sheet map of Antarctica.

A-51715
Centro Ricerca e Documentazione Polare, Rome, **Polar news/ Notizie polari, Vol. 9, No.10,** Oct. 1994, p.49-54, In Italian.

This issue contains the following news items concerning Antarctica: activities of the 13th Indian expedition at Dakshin Gangotri and Maitri stations; the presence of cadmium in antarctic ice; a study of climatological trends in the vicinity of Dumont d'Urville Station covering the last 32 years; coastal ecosystems on subantarctic islands; the decision by the French Government not to repair the weather damaged landing runway at Dumont d'Urville Station; and operations by automatic weather stations.

A-51719
Kuronuma, Y., Tisdell, C.A., **Economics of antarctic minke whale catches: sustainability and welfare considerations,** *Marine resource economics,* Summer 1994, 9(2), p.141-158, Refs. p.154-156.

Clark's bioeconomic model is applied to antarctic minke whales (AMW), the backbone of commercial whaling in 1982 when the International Whaling Commission (IWC) opted for a ban on whaling commencing in 1985-86. The moratorium appears not to be justified from the point of view of saving AMW from extinction or for maximizing the net present value of returns to whalers. Catch quotas before the moratorium are found to be lower than needed for survival of the species and for sustainability of the harvests and returns. It seems that the IWC catch quotas and the moratorium were determined not by conventional bioeconomics but by other factors such as political pressure from conservationists. Nevertheless, even taking such externalities into account, the present moratorium seems not to be Kaldor-Hicks optimal. (Auth.)

A-51744
Capdevila, R., Ageitos, J.M., Melemenis, V., **Restoration of the Swedish hut in Hope Bay** [Restauración de la choza sueca de Bahía Esperanza—II], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1994, No.423, 11p., In Spanish. 1 ref.

An account is given of the activities of a group commissioned to inspect and restore a historic monument in Hope Bay, with a list of the tasks programmed, analysis of their development, and description of materials used for their completion.

A-51777
Miles, J., ed, Walton, D.W.H., ed, **Primary succession on land,** Oxford, Blackwell Scientific Publications, 1993, 309p., For selected papers see 49-1668 through 49-1672 or B-51778 through B-51780.

A 1989 symposium explored many of the factors involved in the primary succession, defined as the replacement of one community by another, of microbial life forms in hot and cold desert regions, but primarily in Antarctica. Participants delved into such fundamentals of succession as how a succeeding community gets there, establishes itself, and grows; the characteristics of the habitat; the influence of allo- and autogenic factors; the progression as conditions of the habitat change; and interactions with other species.

A-51782
New Zealand Antarctic Programme (NZAP), **Report 1993-1994,** Christchurch [1994], 36p.

After briefly considering NZAP's various points of interest—structure, facilities, logistics, information services, environmental stewardship, international project management and visitors—this report outlines the 32 science events that made up the New Zealand research program in 1993-1994 and addressed important atmospheric, biological, physical and geological questions. Four appendices present NZAP financial allocation and program participants in 1993-1994, a list of Ross Dependency Research Committee members, and a list of 1994 publications.

A-51783
New Zealand Antarctic Programme (NZAP), **Report 1992-1993,** Christchurch [1993], 36p.

After briefly considering NZAP's various points of interest—structure, facilities, logistics—this report outlines the New Zealand science activities in 1992-1993 dealing with biological, geological, glaciological, climatological, and environmental questions. Three appendices present NZAP financial allocation and personnel in 1992-1993, and a list of 1993 publications.

A-51784
Netherlands. Committee on Antarctic Research, **NAAP—2000. Netherlands Antarctic Programme 1994-2000,** The Hague, 1994, 71p., Bibliography p.59-69.

After briefly reviewing the Netherlands' involvement in Antarctica since 1967, this report outlines the scientific activities carried out between 1985 and 1993 and presents an overview of the major themes of the Netherlands Antarctic Programme 1994-2000. Both fundamental science and applied science are represented. It is pointed out that the exact formulation of detailed separate projects will depend on scientific developments and on financial limitations. An overview of the proposed budget is given.

A-51822
Italian National Scientific Commission for Antarctic Research, **Italy antarctic research report to SCAR. 1. Apr. 1, 1993-Mar. 31, 1994, record of activities. 2. Apr. 1, 1994-Mar. 31, 1995, planned activities,** Rome, 1994, 91p., Bibliography p.51-91.

After covering the organizational structure of the Italian National Scientific Commission for Antarctic Research, the report lists the facilities and equipment at the Terra Nova Bay Station, including its permanent observatories, and provides highlights of science activities in progress during Apr. 1993-Mar. 1994, and proposed for Apr. 1994-Mar. 1995. Disciplines include biology, cartography, geology, terrestrial and atmospheric physics, glaciology, meteorology, human biology and medicine, and environmental impact assessment.

A-51863
Dickinson, A., **Some aspects of the origin and implementation of the eighteenth century Falkland Islands sealing industry,**

International journal of maritime history, Dec. 1990, II(2), p.33-68, 141 refs., in footnote format.

Sealing has been an important component of the maritime and socio-economic history of many coastal nations. This has particularly been the case for those circum- and subantarctic islands once comprising the Falkland Is., and Dependencies, latterly the Falkland Is., British Antarctic Territory, South Georgia and the South Sandwich Is. Beginning in the mid-eighteenth century, the industry continued sporadically and with varying degrees of success, systematically exploiting and virtually destroying localized stocks of several species throughout the region. This resulted in an ultimately carefully regulated industry on South Georgia which terminated after the 1963 season due to partial cessation of contiguous whaling operations on the island.

A-51886

Childs, J.R., Sliter, R.W., Cooper, A.K., **Progress report on the antarctic Seismic Data Library System for Cooperative Research (SDLS),** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.243-246, 2 refs.

The SCAR Seismic Data Library System for Cooperative Research (SDLS) was adopted in Oct. 1991, under the Antarctic Treaty Consultative Meeting Recommendation XVI-12. It was designed to provide open access to antarctic multichannel seismic reflection (MCS) data at locations around the world to facilitate cooperative research programs in the framework of the ANTOSTRAT project. The SDLS structure, its guidelines outlined in SCAR in 1992, and its implementation are reviewed.

A-51963

Trathan, P.N., Everson, I., Miller, D.G.M., Watkins, J.L., Murphy, E.J., **Krill biomass in the Atlantic,** *Nature,* Jan. 19, 1995, 373(6511), p.201-202, 13 refs.

A group comprising the British Antarctic Survey and the Sea Fisheries Research Institute (South Africa) has reevaluated the total krill biomass from the southwest Atlantic in the region of the Antarctic Peninsula, Drake Passage, South Shetland Islands, South Orkneys, Bransfield Strait and South Georgia. The survey had a transect length of 11,187 km and was done by four vessels from Jan. 19 to Mar. 7, 1981. The new krill biomass production estimate for the southwest Atlantic ranges from 28.6 to 96.7 million tons annually, taking into account the distribution of the krill biomass, locations of predator colonies, and rates of krill immigration and emigration.

A-51990

Reinke-Kunze, C., **Departure into the white wilderness: the history of German polar research** [Aufbruch in die weisse Wildnis: die Geschichte der deutschen Polarforschung], Hamburg, Kabel, 1992, 479p., In German. Refs. p.431-461.

DLC G587.R45

A review of German expeditions to Antarctica and the Arctic is presented in chronological order, from the First German Expedition to the South Pole, 1901-1903, to current research activities at the Georg von Neumayer Station and also conducted on board the *Polarstern.* Aircraft used in polar expeditions, specifically dealing with meteorology data gathering, are described.

A-51991

Hewitt, R.P., Demer, D.A., **Acoustic estimates of krill biomass in the Elephant Island area: 1981-1993,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.1-5, With French, Russian and Spanish summaries. 18 refs.

Acoustic estimates of krill biomass in the vicinity of Elephant I. are presented for the years 1981 to 1993 (with the exception of 1982 and 1986). Estimates for 1981 to 1991 are based on previous reports adjusted for the recently proposed definition of krill target strength. Biomass estimates range from 267 x 10^3 tonnes (Mar.-Apr. 1985) to 4,880 x 10^3 tonnes (Jan. 1993) and biomass densities range from 2.5 g/m^2 to 134.5 g/m^2. Average biomass and average density over the 13 year period were 1,703 x 10^3 tonnes and 53.2 g/m^2. (Auth.)

A-51996

Agnew, D.J., Marín, V.H., **Preliminary model of krill fishery behaviour in Subarea 48.1,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.71-79, With French, Russian and Spanish summaries. 12 refs.

A simple model of the behavior of the krill fishery in FAO Statistical Subarea 48.1 (South Shetland Is. and Antarctic Peninsula) is described. Parameters of the model are calculated from Chilean fishery data over the period 1989 to 1992. The distribution of catches predicted by the model, which is restricted to the four months of Dec. to Mar., compares favorably with the historical distribution of catches in the subarea. A number of management scenarios are considered which involve the closure of a radial zone 50 km offshore from the South Shetland Is., and zones within 100 km of Livingston and Elephant islands. The model predicts that the management option of closing the zones around Livingston and Elephant islands in alternate years would result in an average yearly catch similar to that at present. However, in this scenario, the catch would be more concentrated in foraging areas of land-based predators during alternate years. (Auth.)

A-51997

Butterworth, D.S., Gluckman, G.R., Thomson, R.B., Chalis, S., Hiramatsu, K., Agnew, D.J., **Further computations of the consequences of setting the annual krill catch limit to a fixed fraction of the estimate of krill biomass from a survey,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.81-106, With French, Russian and Spanish summaries. 5 refs.

Butterworth et al. (1992) put forward an extension of the harvesting model of Beddington and Cooke (1983) to relate potential krill yield to a pre-exploitation survey estimate of krill biomass. In this paper, the approach is extended further so as to incorporate most of the amendments specified by the Third and Fourth Meetings of the Working Group on Krill (WG-Krill). The most important of these extensions is integration over the ranges of uncertainty for a number of model parameters. Results are provided for the probability of spawning biomass falling below various fractions of its median pre-exploitation level, as a function of the fraction of the biomass estimate which is set as the catch for a 20 year period. Three possible fishing seasons are considered. (Auth. mod.)

A-51999

Pakhomov, E.A., Pankratov, S.A., **By-catch, growth and feeding of antarctic juvenile fish taken in krill *(Euphausia superba* Dana) fisheries in the South Georgia area, in 1992,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.129-142, With French, Russian and Spanish summaries. 27 refs.

This paper discusses an investigation of juvenile antarctic fish caught during krill fishing by the FV *Grigory Kovtun* in the area around South Georgia from May to July 1992. Two species were predominant in the by-catches: *Champsocephalus gunnari* and *Nototheniops larseni.* The frequency of occurrence of juvenile fish was 18.2% when all krill tows were included and 45.5% when only tows made in shelf waters were considered. The abundance of juvenile fish in catches, normalized to one tonne of krill, ranged from 700 to 18,900 individuals. The mean standard length of *C. gunnari* was 68.5 to 79.7 mm in May and June and 93 mm in late July. The diet, by mass, of both *C. gunnari* fingerlings and *N. larseni* yearlings was dominated by juveniles of krill. The food bolus in *N. larseni* fingerlings consisted mainly of Chaetognatha, Copepoda and furcilia of *Thysanoessa* spp. According to data obtained from the Ukrainian krill fishing fleet in the South Georgia area from May to Aug. 1992, the total removals of *C. gunnari* and *N. larseni* resulting from by-catches are estimated to be 34.3±8.0 and 19.8±3.7 million individuals, respectively. (Auth. mod.)

A-52004

Basson, M., Hoggarth, D.D., **Management and assessment options for the crab fishery around South Georgia,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.193-202, With French, Russian and Spanish summaries. 26 refs.

A new fishery for the lithodid crab *Paralomis spinosissima* started in Subarea 48.3 in 1992. The fishery is also new to CCAMLR, both in terms of the species and fishing gear. The authors provide an overview of the management options for crab fisheries in general and then consider the options in the context of this crab fishery with specific reference to the principles of the CCAMLR Convention. They outline the assessment methodologies and data requirements for the implementation of the various management options. All the features of the fishery and the objectives of the Convention point to the need for a conservative approach to management. Such an approach includes the use of catch/effort controls in addition to the 'size-sex-season' controls. Consideration should also be given to the creation of refuges, though careful attention must be given to their design. One of the main aims in designing a management plan is to allow the fishery to develop at a rate compatible with the expansion of the information base available for assessment. (Auth. mod.)

A-52005

De la Mare, W.K., **Estimating confidence intervals for fish stock abundance estimates from trawl surveys,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.203-207, With French, Russian and Spanish summaries. 6 refs.

A method is developed for calculating asymptotic confidence intervals for estimates of abundance obtained from trawl surveys conducted by means of the swept area method, using likelihood ratios from Aitchison's delta distribution. Simulation tests of the method show that unbiased estimates of density and biomass can be obtained and that the estimated confidence intervals have close to the nominal coverage probability. Performance deteriorates in cases where few of the hauls contain fish and the coefficient of variation (CV) is high. The upper confidence bound appears to be slightly less reliable than the lower. (Auth.)

A-52063

Stonehouse, B., **Tourism and protected areas,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.79-84, 14 refs.

Shipborne tourism in Antarctica, which has operated continuously for over 30 years, appears at present levels to be well managed, with relatively slight environmental impacts, particularly in relation to SPAs, SSSIs and other designated areas. Tour operators and parties ashore have a record of good behavior and environmental awareness. However, tourism is widespread throughout the Antarctic Peninsula sector; its recent expansion seems likely to continue, and there is little precise information on possible impacts at any of the 70 or more landing sites currently in use. Project Antarctic Conservation, an internationally-supported research program currently in its third year (1993-94), is designed to monitor tourism, collect data, assess impacts on vegetation and wildlife, and devise practical management plans and strategies for dealing with this growing industry, applicable within the terms of the Protocol on Environmental Protection to the Antarctic Treaty. (Auth.)

A-52064

Headland, R.K., **Historic sites and monuments,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.85-93, 2 refs.

The subject of historic sites and monuments has much in common with many aspects of other protected areas in the Antarctic, but there are several important distinctions which present special problems. In the case of historic sites and monuments, there are large differences among the many entities involved. This article concerns the 59 features designated under Antarctic Treaty provisions. Historic values and diversity of historic sites and monuments, and maintenance of historic features, are considered. Sixty historic sites and monuments in Antarctica are listed in an appendix.

A-52067

Clarkson, P.D., **Scientific information for protected areas,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.119-121.

In discussing information needs, it is suggested that the primary requirement is the identification of the protected area and of the particular features being protected. Data capture methods, data storage, retrieval and transfer, resources for field studies and resources for a database, are described; the need for data analysis and updating is pointed out.

A-52068

Marks, B., **Public information and education,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.123-128.

The Antarctic Treaty recognized the importance of setting aside areas for protection at its first Consultative Meeting in 1961, with the adoption of Rec. I-9, which was the first step towards protecting historic sites and monuments. This paper reviews the information needed to guide decisions about protected areas, how it may be optimally used, and how to secure public cooperation and support. There is an urgent need to greatly increase the availability of educational materials and public information on protected areas.

A-52069

Harrison, J., **Information management,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.129-134.

Within Annex V of the Protocol, which deals with Area Protection and Management, there are a number of references (in Articles) with implications for the management of information on designated sites. The information management implications of these measures are fairly great, and the role of information manager will become more important as more sites are designated and visits increase. This paper examines two imperatives for information and the questions that flow from them: establishing clear information management procedures which identify who does what and when; and defining and using standard formats for this information to facilitate comparison, evaluation and analysis.

A-52122

Marine Mammal Commission, **Annual report to Congress, 1994,** Washington, D.C., Marine Mammal Commission, 1995, 270p.

This is the 22nd annual report to Congress of the Marine Mammal Commission and its Committee of Scientific Advisors on Marine Mammals. The Commission, established under Title II of the Marine Mammal Protection Act of 1972, provides policy and programmatic guidance on Federal activities, both domestic and international, affecting marine mammal conservation. The section of this report pertinent to Antarctica (p.139-153) includes articles on the conservation and protection of marine mammals in the southern ocean, covering the whale sanctuary areas, the Protocol on Environmental Protection to the Antarctic Treaty, activities of the 23rd Antarctic Treaty Consultative Meeting, tourism and non-govermental activities, environmental impact assessment and monitoring, the krill and finfish fisheries, an outline of the U.S. Antarctic Marine Living Resources Research Program, and the antarctic pack-ice seals program.

A-52135

Mazur, I.I., **Leading trends in scientific and applied research of the Arctic and Antarctica (an interview)** [Osnovnye napravleniia nauchnykh i prikladnykh issledovanii Arktiki i Antarktiki (interv'iu)], *Stroitel'stvo truboprovodov,* Mar. 1994, No.3, p.9-13, In Russian.

This is an interview with I.I. Mazur, Chairman of the Interdepartmental Committee for the Arctic and Antarctic Regions, conducted by T. Cheremushkina. Mazur discusses the problems to be solved by scientists and industrial personnel in the development of these regions. Among the topics discussed are: Russia's national interests, a long term socio-economic program for the development of these regions, rational use of natural resources, protection of the environment (especially the Yamal Peninsula), formation of a scientific-technical policy (especially for Antarctica), studies conducted in the regions of Spitsbergen and Novaya Zemlya, as well as the role of marine transportation in Arctic oil and gas regions.

A-52157

Torres N., D., Jorquera F., D., **Analysis of marine debris collected at Cape Shirreff on Livingston Island** [Análisis de los desechos recolectados en cabo Shirreff, isla Livingston, Shetland del Sur, Antártica], *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1994, No.44, p.81-86, In Spanish with English summary. 6 refs.

A brief analysis of marine debris collected at Cape Shirreff during the 1984-85, 1987-88 and 1990-91 seasons is given. It is proposed that such litter originated with various fishing fleets active in the fishing areas established by the FAO. A total of 1,364 articles were collected, of which 96.1% was plastic fiber or synthetic material; 2.6% metal; 0.9% paper; and 0.4% glass. The synthetic material consisted of strapping bands, ropes, net pieces, broken buoys and plastic cans, with capacity ranging from 0.25 ml to 25 l. It is pointed out that strapping bands and other plastic materials are causing entanglement in antarctic fur seals, and that some bird species are using plastic fibers in the building of their nests. The text of regulations restricting the use of strapping bands in antarctic waters is presented. (Auth. mod.)

A-52160

Antarctica: the extraordinary history of man's conquest of the frozen continent, Sydney, Reader's Digest (Australia), 1990, 320p.

DLC G870.A647

This book is divided into three main parts. Part One explains the basic geology, geography, botany and zoology of the continent and the islands that surround it in the southern ocean. Part Two unfolds in chronological order the story of antarctic exploration, starting from the earliest times and continuing up to the present day. Interspersed among these stories are 17 'special features' which draw together threads that run through most of the explorers' tales. There are pages that cover such topics as entertainment, medicine, food and travel. Part Three contains the following features: an atlas of Antarctica showing the most visited places at a large scale; a time chart of events from the earliest times to the present; and biographies of all the major figures in antarctic exploration.

A-52165

Sharma, I.C., **Antarctica: geopolitics and resources,** New Delhi, Inter-India Publications, 1992, 226p. + 12 plates, Refs. passim. Bibliography p.219-222.

DLC G860.S48

This book gives an account of all Indian expeditions to Antarctica. It includes the historical background of the discovery of the continent, the origin of Antarctica, its geological past, mountains, rocks, minerals and biotic and abiotic potential and its impact on international trade. Also presented is a geopolitical appraisal of Antarctica and its neighboring islands.

A-52173

Lüdecke, C., **Significance of Alexander von Humboldt for scientific research in Antarctica** [Die Bedeutung Alexander von Humboldts für die wissenschaftliche Erforschung der Antarktis], Studia Freibergensia: Vortrage des Alexander von Humboldt Kolloquiums in Freiberg vom 8 bis 10 November 1991 aus Anlass des 200. Jahrstages von A.v. Humboldts Studienbeginn an der Bergakademie Freiberg. Edited by U. Leitner et al, Berlin, Akademie Verlag, 1994, p.177-187, In German. 27 refs.

DLC Q143.H9A672 1991

In 1836, Humboldt wrote to the President of the Royal Society in London suggesting that measurement of the magnetic inclination, declination, and intensity from the equator to the poles would be a useful activity, since at that time almost nothing was known of the southern polar regions. The first scientific voyages of Cook and Bellingshausen had made the existence of a southern continent seem likely; later, these areas would come under the influence of whalers and sealers at several sites at the edges of the southern polar regions. Humboldt's letter produced a race to the South Magnetic Pole, in which d'Urville, Wilkes, and Ross joined with expeditions between 1837 and 1842. Ross was cognizant of not only the extent of the Ross Sea from his navigation measurements but also of measurements of the South Magnetic Pole. Thereafter scientific research in and about the southern polar regions, which Humboldt inspired, remained dormant until the turn of the century.

A-52194

Polar Libraries Colloquy, 15th, Cambridge, UK, July 3-8, 1994, Walton, D.W.H., ed, Mills, W., ed, Phillips, C.M., ed, **Bi-polar information initiatives—the needs of polar research; Proceedings,** Huntingdon, Bluntisham Books, 1995, 204p., Refs. passim. For selected papers see 49-2977 through 49-3000 or A-52195 through A-52203.

This compilation includes 52 papers and abstracts, 13 of which are pertinent to Antarctica, presented at the 15th Polar Libraries Colloquy held in Cambridge, England, on July 3-8, 1994. Central to the Colloquy was a consideration of the contrasts and similarities reflected in the research databases for both the Arctic and the Antarctic, with the view of enhancing the mutual interchange of library and bibliographic records among organizations, and especially of improving the efficiency of bibliographic coverage of scientific publications by eliminating redundancy of citations among individual bibliographies. Also discussed was the conversion of current collection databases to computer network compatibility; certain economic and manpower problems which constrain individual polar libraries in their exploitation of available computer and telecommunication technology; and difficulties inherent in the acquisition and dissemination of grey literature.

A-52195

Andrews, M., **Are we information poor? Limitations to accessing polar literature,** Polar Libraries Colloquy, 15th, Cambridge, UK, July 3-8, 1994. Proceedings. Bi-polar information initiatives: the needs of polar research. Edited by D.W.H. Walton et al, Huntingdon, Bluntisham Books, 1995, p.5-7, 4 refs.

The several library catalogues and reference databases published on the PolarPac and Arctic & Antarctic Regions CD-ROMs have been analyzed with grant support from The Council on Library Resources (CLR). Results show that approximately one third of the polar literature currently lacks effective bibliographic control. At the same time, there is a high incidence of duplicate accessioning. The "citation gap" resulting from lack of coverage is primarily a function of document type, rather than of scientific discipline or particular geographic area. Technical reports, book chapters, conference papers, dissertations, maps, and articles in "non-polar" (discipline-oriented) journals are less likely to be selected for indexing than articles in peer-reviewed polar regions journals. In order to expand upon this finding, further research, based on the Institute of Arctic and Alpine Research (INSTAAR) Publications List for the past 25 years, was undertaken. The results of this study indicate a shift in publication type away from technical reports and toward "non-polar," peer-reviewed journals. The process of reducing duplicate indexing by distributing responsibilities between database producers is presently being addressed. The process of achieving true bibliographic control over the polar regions literature must also be addressed. Discipline oriented journals and non-journal document types must be scanned regularly for polar regions information. Improved coverage of the literature, which is on the verge of escaping bibliographic control, will benefit the entire international user community. (Auth.)

A-52196

Stonehouse, B., **Polar tourism: do library resources meet researchers' information needs,** Polar Libraries Colloquy, 15th, Cambridge, UK, July 3-8, 1994. Proceedings. Bi-polar information initiatives: the needs of polar research. Edited by D.W.H. Walton et al, Huntingdon, Bluntisham Books, 1995, p.25-28, 5 refs.

Recent development at the Scott Polar Research Institute of an interdisciplinary study on polar tourism has raised the issue of how adequate are current polar library resources in meeting the bibliographic and archival needs of a new research field, and how much help researchers in such a field may expect from the polar library network. In a case like this, where parts of the relevant literature are non-polar and parts non-academic, standard bibliographic databases reflecting the holdings of particular academic libraries, and standard regional reference works are found to be inadequate. The most likely solution appears to be the designation of one center as a specialist library on polar tourism, and employment of a specialist librarian for cataloguing and archiving material from all sources, who will make the material available to other research centers. A parallel is drawn with the existing ICSU World Data Centre organization for glaciology and other scientific topics. (Auth.)

A-52197

Goerler, R.E., Hite, R., **Admiral Richard E. Byrd and history: an assessment of his papers at the Byrd Polar Research Center, The Ohio State University,** Polar Libraries Colloquy, 15th, Cambridge, UK, July 3-8, 1994. Proceedings. Bi-polar information initiatives: the needs of polar research. Edited by D.W.H. Walton et al, Huntingdon, Bluntisham Books, 1995, p.65-70, 9 refs.

More than any other individual, Richard E. Byrd (1888-1957) was responsible for establishing the continuing scientific and governmental presence of the United States in Antarctica. As a pioneer in aviation and aerial navigation, Byrd demonstrated that airplanes could fly in polar environments, first by flying in the Arctic in 1926 and then by using airplanes to explore and survey Antarctica during the remainder of his life. Despite the public record of accomplishment, the papers of Admiral Byrd remained hidden and inaccessible to biographers and scholars for many years. In 1990 the Byrd Polar Research Center acquired the last of Byrd's papers. In 1994 the work of describing and making available the documentation of Byrd's career will be completed. The authors discuss Byrd's papers with reference to questions that have been asked by historians and to historical research that could be undertaken by using the collection. (Auth. mod.)

A-52198

Grossi, K.M., **Sir George Hubert Wilkins as scientist, geographer, and consultant to the United States military,** Polar Libraries Colloquy, 15th, Cambridge, UK, July 3-8, 1994. Proceedings. Bi-polar information initiatives: the needs of polar research. Edited by D.W.H. Walton et al, Huntingdon, Bluntisham Books, 1995, p.71-75, 5 refs.

The career of Sir George Hubert Wilkins is relatively unknown, especially in his native Australia. Besides being the first to fly the trans-Arctic Sea route, the first to fly an airplane over Antarctica, and the leader of the expedition in which a submarine travelled under arctic pack ice for the first time, Wilkins was a scientist, photographer, newspaper correspondent, lecturer, geographer, author and a consultant to the U.S. military. This paper examines his work in Northern Australia and adjacent islands, and his career as a consultant on hot and cold weather clothing and survival techniques for the United States military, as two examples of the lesser-known accomplishments of this great man. The Sir George Hubert Wilkins Papers are located at the Ohio State University Archives and are open to researchers. The author, with the help of student assistants, has processed the collection and compiled a finding aid. (Auth. mod.)

A-52199

Headland, R.K., **Archival data and the assessment of polar climatic change,** Polar Libraries Colloquy, 15th, Cambridge, UK, July 3-8, 1994. Proceedings. Bi-polar information initiatives: the needs of polar research. Edited by D.W.H. Walton et al, Huntingdon, Bluntisham Books, 1995, p.87-92, 1 ref.

Selected examples of the use of various older records are given to extend and improve modern analysis of climatic changes. These particularly concentrate on both polar regions. Indications of what might be useful for future investigation are given. A synopsis of data from ships which wintered in the Canadian Arctic during the last century is given. (Auth.)

A-52200

Brennan, A.M., **Access to Russian glaciological literature,** Polar Libraries Colloquy, 15th, Cambridge, UK, July 3-8, 1994. Proceedings. Bi-polar information initiatives: the needs of polar research. Edited by D.W.H. Walton et al, Huntingdon, Bluntisham Books, 1995, p.104-106, 4 refs.

The literature on glaciology published in Russia and the other states of the former Soviet Union is extensive. For example, an annotated list of Soviet literature for 1989 published in *Materialy Gliatsiologiskikh Issledovanii* lists almost 800 titles covering all areas of snow and ice research, with the exception of permafrost. This paper describes steps taken to determine what percentage of the Russian literature is received, indexed, and available to researchers in the U.S. It also reports on preliminary discussions between representatives of the Institute of Geography of the Russian Academy of Sciences and the World Data Center A for Glaciology on steps needed to make this literature more readily available. (Auth.)

A-52201

Hibben, S.G., **Conversion of the Cold Regions Bibliography,** Polar Libraries Colloquy, 15th, Cambridge, UK, July 3-8, 1994. Proceedings. Bi-polar information initiatives: the needs of polar research. Edited by D.W.H. Walton et al, Huntingdon, Bluntisham Books, 1995, p.130.

The Cold Regions Bibliography has been converted to a commercial software called STAR, which has a proven record as a powerful and versatile database management system. The existing database has now been copied from its MARC format into STAR records with equivalent fields, and a new entry form has been designed for future citation input. STAR also includes the FrameMaker desktop printing software which will compose camera-ready copy for production printing. After database definition and software debugging, the full file of some 180,000 records has been copied into STAR in the host Sun computer at the Library of Congress, where it may be accessed over Internet. The paper discusses some features of the database design, and gives examples of data entry and search methods. We now have the technical capability to disseminate the indexing as well as providing search access; the Cold Regions staff will be inputting records via Internet, and others could do the same from any Internet node. As a first step in joint indexing, SPRI and the Cold Regions Project have agreed to collaborate on inputting of antarctic records in the bibliography, and this plan has received the approval of the CRBP sponsors. In addition to sharing the antarctic journal indexing, SPRI can provide valuable input in the area of antarctic grey literature, notably from Australia and New Zealand as well as other European sources. (Auth.)

A-52202

West, C.E., **Building a polar want list using the Internet,** Polar Libraries Colloquy, 15th, Cambridge, UK, July 3-8, 1994. Proceedings. Bi-polar information initiatives: the needs of polar research. Edited by D.W.H. Walton et al, Huntingdon, Bluntisham Books, 1995, p.142-145, 2 refs.

The effort to keep abreast of publications related to polar issues on an international scale can be slow and time consuming. Recent developments in international electronic communication provide opportunities for identification of desirable polar subject items which were not possible as recently as five years ago. This paper presents results of an experiment to determine the utility of using the Internet to compile a want list of desired monographs. The polar collections of the University of Alaska Fairbanks have known areas of subject weakness. A selection of subjects were searched in internationally available library catalogues on the Internet. Publications identified were compared to holdings of the Rasmuson

Library to determine items not owned. Results of this process are reported together with time invested per identified desirable monograph. An evaluation of this process for collection building is included together with some discussion of its opportunities and limitations. (Auth.)

A-52203

Ashby, D., **Gateway to Antarctica, an Internet World Wide Web server for antarctic information,** Polar Libraries Colloquy, 15th, Cambridge, UK, July 3-8, 1994. Proceedings. Bi-polar information initiatives: the needs of polar research. Edited by D.W.H. Walton et al, Huntingdon, Bluntisham Books, 1995, p.147-148.

Over the past few years the numbers of organizations and individuals connected to Internet has grown dramatically, and with this growth there have been significant changes in the way information is transferred over Internet. The World Wide Web (WWW) is one of the latest such advances in information exchange using Internet. WWW is another application like e-mail, Telnet, FTP, Usenet news, and Gopher, that uses the communication channels of Internet to transfer information from one computer to another. In fact, WWW is now the third highest generator of network traffic over Internet. When part of the Internet backbone in the US was monitored earlier this year, over 1/3 of a terabyte of WWW data were seen passing through the network during a one month period. The 'Gateway to Antarctica' is a WWW server specializing in antarctic information, with sections containing scientific, logistic, educational, and treaty information. It also provides links to much of the Antarctic related data already on Internet.

A-52205

Flynn, M.T., Bubenheim, D.L., Straight, C.L., Belisle, W., **Controlled Ecological Life Support System Antarctic Analog Project: analysis of wastewater from the South Pole Station, Antarctica, Volume 1,** *U.S. National Aeronautics and Space Administration. Technical memorandum,* Aug. 1994, NASA-TM-108836, 21p., N95-10826, 12 refs.

The Controlled Ecological Life Support System (CELSS) Antarctic Analog Project (CAAP) is a joint National Science Foundation (NSF) and NASA project for the development, deployment and operation of CELSS technologies at Amundsen-Scott Station. NASA goals are operational testing of CELSS technologies and the conduct of scientific studies to facilitate technology selection and system design. The NSF goals are that the food production, water purification, and waste treatment capabilities which will be provided by CAAP will improve the quality of life for the South Pole inhabitants, reduce logistics dependence, and minimize environmental impacts associated with human presence on the polar plateau. This report presents an analysis of wastewater samples taken from the Amundsen-Scott Station. The purpose of the work is to develop a quantitative understanding of the characteristics of domestic sewage streams at the station. This information will contribute to the design of a proposed plant growth/waste treatment system which is part of the CELSS CAAP. (Auth.)

A-52206

Zalewski, S.M., ed, Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994, **XXI Polar Symposium: 60 years of Polish research of Spitsbergen,** Warsaw, Polish Academy of Sciences, 1994, 371p., Refs. passim. For selected papers see 49-3003 through 49-3027 or B-52217, B-52218, B-52220, E-52207 through E-52212, I-52216, J-52215, J-52219, L-52213 and L-52214.

This volume contains a selection of scientific papers presented at the Symposium, 14 of which concern Antarctica in the areas of geology and paleobiology, geophysics, geography, meteorology, and terrestrial and marine biology.

A-52232

Shi, Y.F., Li, J.J., **New progress on the glaciological and Quaternary glaciation research in China since the 1980s,** *Journal of glaciology and geocryology,* Mar. 1994, 16(1), p.1-14, In Chinese. 74 refs.

The resurgence of Chinese glaciological and Quaternary research since 1978 after the Cultural Revolution is summarized, particularly in Antarctica, China, and the Himalayas. The emphasis in antarctic glaciological research has been on past and present climates and indications of possible future global change as recorded in ice cores and snow pits from the ice sheet.

A-52302

Lüdecke, C., **German polar research since the turn of the century and the influence of Erich von Drygalski** [Die deutsche Polarforschung seit der Jahrhundertwende und der Einfluß Erich von Drygalskis], *Berichte zur Polarforschung,* 1995, No.158, 340p. + 72p. appends., In German with English summary. This work is the unaltered version of a dissertation which was submitted to the Fachbereich Mathematik der Ludwig Maximilians Universität zu München in October 1993. Refs p.305-326.

Since Drygalski repeatedly dealt with concerns of polar research in his publications until 1944, he became a natural reference of the work presented here. This treatise covers the period from the turn of the century until WWII; within this time frame the first three German antarctic expeditions took place under the leadership of Drygalski (1901-03), Wilhelm Filchner (1911-1912), and Alfred Ritscher (1938-1939). These expeditions as well as the failed Schröder-Stranz Svalbard Expedition (1912-1913), Alfred Wegener's expeditions to Greenland (1929, 1930-31), the Aeroarctic expedition aboard a zeppelin to the Arctic Ocean (1931) and the participation in the II International Polar Year (1932-33) are analyzed in detail. Also provided are supplementary data dealing with the planning of some expeditions which were not carried out. (Auth. mod.)

A-52304

Centro Ricerca e Documentazione Polare, Rome, **Polar news/ Notizie polari, Vol.10, No.1,** 1995, p.1-7, In Italian.

This issue contains the following news items concerning Antarctica: the RADARSAT project for environmental monitoring; an international ice drilling project at Robert Point; Russia's request to the International Whaling Commission to revise its position on protected areas; the changes in supply operations at Dumont d'Urville Station due to critical ice conditions; the dismantling of Vanda Station, built in the summer of 1967-1968; ice coring at Vostok Station, no longer a year-round operation; construction plans at Halley Station for a building on skates; and QANTAS' rescheduling of tourist flights to Antarctica.

A-52305

Centro Ricerca e Documentazione Polare, Rome, **Polar news/ Notizie polari, Vol.9, No.12,** 1994, p.61-66, In Italian.

This issue contains the following news items concerning Antarctica: recovery of eleven lunar meteorites from antarctic ice fields; ultraviolet radiation tolerance mechanism in living organisms; the presence of heavy metals in crustaceans from the Antarctic Peninsula; and a study on King penguins showing considerable stress reaction to aircraft noise.

A-52306

Centro Ricerca e Documentazione Polare, Rome, **Polar news/ Notizie polari, Vol.9, No.11,** 1994, p.55-60, In Italian.

This issue contains the following news items concerning Antarctica: recent ozone hole intensity and shape; the breakup of Wordie Ice Shelf; diving patterns and foraging behavior of cormorants; and plans to rebuild Amundsen-Scott Station.

A-52349

Robert, J., **Antarctica and Adélie Land** [L'Antarctique et la Terre Adélie], Aix-en-Provence, Édisud, 1990, 128p., In French. 8 refs.

DLC G890.A4R63

The six chapters of this book cover, respectively: the discovery of Antarctica; the investigation of the continent, from the Mawson and Shackleton Expedition of 1911-1917 to the international cooperation during IGY (1957-59); the inhospitable climate; the growing scientific interest in this unique laboratory, and men's living and working conditions in it; a discussion on territorial claims, including the history of France's involvement in Adélie Coast and the subantarctic islands in the Indian Ocean; a review of the Antarctic Treaty; and concerns for the future of Antarctica, especially with regard to resource exploitation, pollution and the threat posed by tourism.

A-52371

Child, J., **Politics and ecology of tourism in the South American Quadrant of Antarctica,** *MACLAS: Latin American essays,* 1994, Vol. VIII, Selected papers presented at the 15th Annual Conference of the Middle Atlantic Council of Latin American Studies, New Jersey, Apr. 1994. Edited by J. Espadas, V.B. Reber and H.D. Sims, p.121-139, Refs. p.138-139.

Tourism as an antarctic environmental issue is addressed in terms of its role as a prime example of a sustainable alternative to mass tourism, and as a parallel to "alternative sustainable development". In this connection, the concept of the "carrying capacity" of the small number of choice sites visited by antarctic tourists is explored. These sites are concentrated in the South American Quadrant of Antarctica, and are the ones where scientific, ecological and commercial interests are increasingly clashing. The paper continues with a brief history of antarctic tourism and a description of its mechanics, economics and politics, especially as they pertain to the South American Quadrant. Existing and proposed measures to control antarctic tourism are also explored before reaching conclusions. The geographic scope of the paper concentrates on that portion of Antarctica bounded by the Greenwich (prime) meridian and the 90° west meridian, and includes the areas claimed as part of their sovereign territory by Argentina, Chile, and the United Kingdom.

A-52373

Wilder, M., **Antarctica: An economic history of the last continent,** Australia. The University of Sydney. Department of Economic History, 1992, 155p., Refs. passim. Bibliography p.142-152.

DLC HC733.W55

Chapter 1 of this book begins with a history of exploration and discovery in Antarctica in order to provide an historical context for a survey of antarctic interests. It highlights the way in which such exploration, motivated by economic interests, was dominated by the major European powers. This section traces, in particular, the development of Australian antarctic interests. Chapter 2 examines the historical interest of each of the major antarctic resources. It also evaluates the validity and potential of each resource in the past and for the future. The development of Australia's economic interest is again assessed. The third and final chapter places the economic development of antarctic interests into the wider international context and discusses the inter-relationships among antarctic economic interests and antarctic politics, strategy and defence, and conservation. It concludes with possible strategies for the development of Antarctica.

A-52374

Belgian Science Policy Office. Prime Minister's Services, **Belgian scientific research programme on the Antarctic. Phase III. Synopsis,** Brussels, Belgian Science Policy Office, Feb. 1994, 39p.

This volume represents the third phase of the Belgian Scientific Research Programme on the Antarctic. It consists of nine projects covering seven research themes in three fields: marine ecodynamics and climatic interactions; evolution and protection of marine ecosystems; and the role of the Antarctic in global changes. The name of the principal investigator, and the title, theme, objectives and tasks of each project are included.

A-52375

Hayward, J., ed, Macfarlane, M.J., ed, Keys, J.R., ed, Campbell, I.B., ed, **Decommissioning Vanda Station, Wright Valley, Antarctica,** Ross Dependency Research Committee. New Zealand Antarctic Programme, Wellington, Mar. 1994, var. p.

This initial Environmental Evaluation (IEE) outlines the process that the New Zealand Antarctic Programme intends to adopt in the decommissioning of Vanda Station. The main points arising from this IEE are: that Vanda Station should be removed in the near future due to the threat of inundation by rising lake level; that the scale of remedial actions be determined by studies of the nature and level of any contamination, and from advice on the likely impact of this contamination on scientific values of Lake Vanda; that the Ross Dependency Research Committee monitor the progress of decommissioning; and that a comprehensive environmental evaluation is not required. (Auth. mod.)

A-52381

Macqueen, A.D., ed, **Navigation in ice-covered waters: a bibliography,** WDC-C bibliographies. Series A. Glaciological topic 17, Cambridge, England, University, Scott Polar Research Institute, World Data Centre C for Glaciology, 1993, 23p., WDCA 93000661, 260 citations.

This bibliography lists all relevant publications on navigation in ice covered waters entered through June 1993 in the SPRILIB database of the World Data Centre C for Glaciology, Scott Polar Research Institute Library, University of Cambridge, England. Of a total of 260 citations, 25 are explicitly pertinent to Antarctica and others are implied. Each citation is annotated; a subject/geographic index and author index are included.

A-52382

Macqueen, A.D., ed, **Icebreakers and ice-strengthened vessels: a bibliography,** WDC-C bibliographies. Series A. Glaciological topic 16, Cambridge, England, University, Scott Polar Research Institute, World Data Centre C for Glaciology, 1993, 46p., WDCA 93000660, 619 citations.

This bibliography lists all relevant publications on icebreakers and ice-strengthened vessels entered through June 1993 in the SPRILIB database of the World Data Centre C for Glaciology, Scott Polar Research Institute Library, University of Cambridge, England. Of a total of 619 citations, 45 are explicitly pertinent to Antarctica and others are implied. Each citation is annotated; a subject/geographic index and author index are included.

A-52383

Macqueen, A.D., ed, **Glaciohydrology: a bibliography,** WDC-C bibliographies. Series A. Glaciological topic 11, Cambridge, England, University, Scott Polar Research Institute, World Data Centre C for Glaciology, 1993, 64p., WDCA 93000659, 730 citations.

This bibliography lists all relevant publications on glaciohydrology entered through June 1993 in the SPRILIB database of the World Data Centre C for Glaciology, Scott Polar Research Institute Library, University of Cambridge, England. Of a total of 730 citations, 62 are explicitly pertinent to Antarctica and others are implied. Each citation is annotated; a subject/geographic index and author index are included.

A-52384

Macqueen, A.D., ed, **Chemistry of ice: a bibliography,** WDC-C bibliographies. Series A. Glaciological topic 6, Cambridge, England, University, Scott Polar Research Institute, World Data Centre C for Glaciology, 1993, 45p., WDCA 93000658, 658 citations.

This bibliography lists all relevant publications on the chemistry of ice entered through June 1993 in the SPRILIB database of the World Data Centre C for Glaciology, Scott Polar Research Institute Library, University of Cambridge, England. Of a total of 658 citations, 13 are explicitly pertinent to Antarctica and others are implied. Each citation is annotated; a subject/geographic index and author index are included.

A-52385

Macqueen, A.D., ed, **Physics of ice: a bibliography,** WDC-C Bibliographies. Series A. Glaciological topic 5, Cambridge, England, University, Scott Polar Research Institute, World Data Centre C for Glaciology, 1993, 86p., WDCA 93000657, 1190 citations.

This bibliography lists all relevant publications on the physics of ice entered through June 1993 in the SPRILIB database of the World Data Centre C for Glaciology, Scott Polar Research Institute Library, University of Cambridge, England. Of a total of 1190 citations, 26 are explicitly pertinent to Antarctica and others are implied. Each citation is annotated; a subject/geographic index and author index are included.

A-52386

Macqueen, A.D., ed, **Ice coring and ice cores: a bibliography,** WDC-C Bibliographies. Series A. Glaciological topic 3, Cambridge, England, University, Scott Polar Research Institute, World Data Centre C for Glaciology, 1993, 55p., WDCA 93000656, 672 citations.

This bibliography lists all relevant publications on ice coring and ice cores entered through June 1993 in the SPRILIB database of the World Data Centre C for Glaciology, Scott Polar Research Institute Library, University of Cambridge, England. Of a total of 672 citations, 222 are explicitly pertinent to Antarctica and others are implied. Each citation is annotated; a subject/geographic index and author index are included.

A-52387

Macqueen, A.D., ed, **Glacier advance and retreat: a bibliography,** WDC-C bibliographies. Series A. Glaciological topic 2, Cambridge, England, University, Scott Polar Research Institute, World Data Centre C for Glaciology, 1993, 51p., WDCA 93000655, 671 citations.

This bibliography lists all relevant publications on glacier advance and retreat entered through June 1993 in the SPRILIB database of the World Data Centre C for Glaciology, Scott Polar Research Institute Library, University of Cambridge, England. Of a total of 671 citations, 75 are explicitly pertinent to Antarctica and others are implied. Each citation is annotated; a subject/geographic index and author index are included.

A-52388

Macqueen, A.D., ed, **Ice and climate: a bibliography,** WDC-C bibliographies. Series A. Glaciological topic 1, Cambridge, England, University, Scott Polar Research Institute, World Data Centre C for Glaciology, 1993, 70p., WDCA 93000654, 852 citations.

This bibliography lists all relevant publications on ice and climate entered through June 1993 in the SPRILIB database of the World Data Centre C for Glaciology, Scott Polar Research Institute Library, University of Cambridge, England. Of a total of 852 citations, 111 are explicitly pertinent to Antarctica and others are implied. Each citation is annotated; a subject/geographic index and author index are included.

A-52389

Australian Antarctic Division. Department of the Arts, Sport, the Environment, Tourism and Territories, **Deep ice drilling on Law Dome: initial environmental evaluation,** 1989, 25p. + Attachments, 6 refs.

A preliminary evaluation has been made of the environmental impact of the proposed project 'Deep Ice Drilling on Law Dome'. This report focuses on the choice of constituents for the borehole loading fluid, and on comparative evaluations of their possible environmental impacts. It is acknowledged that emission of ozone depleting substances should be avoided wherever possible, and for this reason, the use of chlorofluorocarbons (CFCs) in the borehole fluid has been ruled out in favor of tetrachloroethylene. The major impact of the proposal is the eventual escape of the fluid into the atmosphere and marine environment many thousands of years into the future. This assessment considers the benefits to scientific understanding which can be expected from the intended research on the ice cores, and takes into account the precautionary procedures to be followed during the project and in handling borehole fluid constituents. (Auth. mod.)

A-52390

Germany. National Committee on Antarctic Research, **Annex to National Antarctic Research Report to SCAR No.10: Digital Name Data Base Antarctic** [Digitale Namendatenbank Antarktis], Frankfurt, Institut für Angewandte Geodäsie, 1988, var. p., In German.

An alphabetical list is presented of geographic names in the German language for topographic and geographic features and regions of the Antarctic, with bibliography and reference index. Introductory text, describing the database and other information pertinent to the names it contains, is also presented in English, French, Russian and Spanish.

A-52391

Royds Consulting Limited, **New Zealand Antarctic Programme environmental audit under the 1991 Madrid Protocol,** Christchurch, Mar. 1994, 148p.

This document presents the findings of an environmental audit of the New Zealand Antarctic Programme (NZAP) undertaken by Royds Consulting Ltd between Nov. 1993 and Mar. 1994. The purpose of the audit was to evaluate NZAP activities with respect to the formal requirements of the Protocol on Environmental Protection to the Antarctic Treaty, 1991 (The Protocol) and the New Zealand Antarctic (Environmental Protection) Bill No.259-1 presently before Parliament. An evaluation of NZAP under some parts of New Zealand resource management/health and safety legislation was also undertaken. The audit collates and documents compliance with legal and corporate requirements. It also provides verification, by inspection, of the establishment and operation of mechanisms and procedures in place to protect the environment and personnel from harm.

A-52392

Santiago de Chile. Instituto Antártico Chileno, **Boletín Antártico Chileno, Vol.13, No.2,** Nov. 1994, 47p., In Spanish. Refs. passim.

This bulletin reviews the following: the socio-political, environmental and economic aspects of permanent human presence in Antarctica; the role of technology and logistics as an aid to science; a census of antarctic mammals and seabirds during winters of 1993 and 1994; plans for a joint Chilean and American study of sea ice characteristics in the South Pacific Ocean; details of a voyage to Antarctica in Feb. 1948 by the First Lady of Chile; national activities, including INACH research, celebrations and the inauguration of a National Data Center; international activities covering various conferences, including the 18th Antarctic Treaty Consultative Parties meeting in Kyoto and the 23rd SCAR reunion in Rome; and miscellaneous news.

A-52395

Wakefield, J., **NSF's South Pole Station plan clears technical hurdles,** *Eos*, July 19, 1994, 75(29), p.321,328-329.

A National Science Foundation review panel has approved the proposed South Pole Redevelopment Plan, which would take about 8 years to complete and cost more than $171 million. If not rebuilt, the already overburdened Amundsen-Scott Station will be rendered useless within the decade, according to NSF officials. Present conditions at the nearly 20-year old station are already hurting the efficiency of environmental and global change research conducted there, as well as the morale of scientists who not only work and live in isolation from the rest of the world for months at a time, but endure many hardships, such as temperatures that reach -85°C in winter. The "blue ribbon" panel, the third hurdle of an NSF review process begun this spring, will pass its findings on to the National Science Board, NSF's governing body, as part of an overall report on the plan to be voted up or down at a regularly scheduled board meeting in mid-Aug. (Auth. mod.)

A-52403

Argentina. Dirección Nacional del Antártico, **Argentine Republic national report to SCAR No.35, 1993: Apr. 1, 1992-Mar.31, 1993, report on activities; Apr.1, 1993-Mar.31, 1994, planned activities,** Buenos Aires, Instituto Antártico Argentino, 1993, 74p., Refs. p.56-70.

This report provides the following: information on, and a map of, Argentine permanent and summer stations; highlights of research carried out on the ships *Almirante Irizar* and *Francisco de Gurruchaga;* a report on activities from Apr. 1, 1992 to Mar. 31, 1993, covering investigations in atmospheric and Earth sciences, oceanography, biology, logistics, medicine, geodesy and geography, and conservation; planned activities for Apr. 1, 1993 to Mar. 31, 1994, involving the same disciplines as in the previous year; and a list of principal investigators and responsible authorities.

A-52404

Finnish National Committee on Antarctic Research, **Finland antarctic research report to SCAR August, 1994: Apr. 1, 1993-Mar. 31, 1994 record of activities; Apr. 1, 1994-Mar. 31, 1995 planned activities,** Helsinki, Aug. 1994, 18p., 5 refs.

The report provides the following: information on Aboa Station and permanent observatories; highlights of the 1993-94 research activities, including a study to quantify carbon production in the microbial foodweb in surface antarctic waters of the Indian Ocean, a geological survey in Queen Maud Land, geophysical measurements and climate monitoring, and ozone measurements; a prospectus of planned activities for 1994-95, mainly at Aboa Station and, jointly with Argentina, at Marambio Station; and a list of principal investigators and responsible authorities.

A-52405

Swedish National Committee for Antarctic Research, **Swedish antarctic research report to SCAR No.7, 1994: report on scientific activities 1993/94; planned activities 1994/95,** Stockholm, Sep. 1994, 28p., 19 refs.

The report provides the following: information on, and a map of, Swedish stations in Antarctica; highlights of the 1993-94 science activities, including research carried out during the Swedish ITASE Expedition on firn cores, snow accumulation and ice thickness; glaciological studies in Queen Maud Land; geodetic surveys to validate ERS-1 data; biological and environmental investigations; the Swedish-American Amanda project to build a neutrino detector at the South Pole; research carried out on South Georgia on King penguins and southern elephant seals; activities planned for 1994-95 involving the Amanda project, Quaternary studies in Victoria Land and studies on antarctic fishes; and a list of principal investigators and responsible authorities.

A-52406

New Zealand National Committee for Antarctic Research, **New Zealand Antarctic Research Programme report to SCAR No.36, 1994: 1993-94 record of activities; 1994-95 planned activities,** Christchurch, 1994, 39p., Bibliography p.37-39.

The report provides the following: information on, and a map of, New Zealand's permanently manned stations and summer only stations and refuges; observations carried out at Scott Base, covering seismology, geomagnetism, meteorology, and ionospheric physics; highlights of science activities for Apr. 1, 1993-Mar. 31, 1994 in biology, geodesy and cartography, geology, glaciology, atmospheric and Earth physics, and oceanography; a list of principal investigators and responsible authorities in both past and planned activities; and a prospectus of planned activities for Apr. 1, 1994-Mar. 31, 1995, involving the same disciplines as in the previous year.

A-52417

Alfred Wegener Institute for Polar and Marine Research, **Report 1992/93,** Bremerhaven, Germany, [1994], 188p., Refs. p.167-187.

Antarctic and arctic research programs of the Alfred Wegener Institute for Polar and Marine Research for 1992 and 1993 are summarized. Research pertinent to Antarctica includes marine biology, extent of sea ice past and present, environmental history in lake sediments, satellite imaging of sea ice, sea ice algae, and global ocean circulation. In Mar. 1992, the Potsdam Research Unit was incorporated into the Alfred Wegener Institute to continue the former East German research, particularly on the unglaciated oases and stratospheric ozone in Antarctica. A review of the budget, personnel, publications list, and expeditions sponsored by the institute are also included.

A-52429

Scientific Committee on Antarctic Research, **SCAR bulletin No.114, July 1994,** Cambridge, 1994, 18p., 5 refs.

This bulletin includes the following: Recommendation XVIII-1 regarding tourism and non-governmental activities, and guidance for visitors to the Antarctic, adopted by the 18th Antarctic Treaty Consultative meeting held Apr. 11-22, 1994, in Kyoto, Japan; and the SCAR-COMNAP *ad hoc* Planning Group on Antarctic Data Management report of the 2nd meeting, held in Boulder, CO, Sep. 1993, covering the Antarctic Data Directory System and its implementation, review of progress and future issues.

A-52450

Elzinga, A., ed, **Changing trends in antarctic research,** Dordrecht, NE, Kluwer Academic Publishers, 1993, 161p.

DLC G845.C48 1993

This volume was assembled from presentations given at an international symposium in Göteborg, Sweden in the early fall of 1991 to mark the 30th anniversary year of the coming into force of the Antarctic Treaty. Discussions centered on changes in emphasis from almost exclusively pure scientific research and its logistical support to the political relationships which have developed over the thirty year life of the Treaty. Five sections outline the new emphasis: historical and contemporary issues of science in polar regions; the functional role of science in the ATS, including negotiations, scientific advice, and pressures and strategic orientation of research; increasing bureaucratization through regulating devices; orientational shifts in research agendas, such as environmental considerations and conflicts between basic research and commercial prospecting. The volume concludes with an assessment of SCAR in its role as international coordinator of antarctic research effort.

A-52455

Institut für Angewandte Geodäsie, **Index of German language place names of the Antarctic. Second edition** [Verzeichnis deutschsprachiger geographischer Namen der Antarktis. 2. Ausgabe], Frankfurt am Main, [Germany], Institut für Angewandte Geodäsie, 1993, 30p., In German. Front matter in German and English. Refs. p.23-30.

This list is an extract of an antarctic place-names database created at the Institut für Angewandte Geodäsie (IFAG), Frankfurt am Main. It includes those antarctic topographical and geographical features which have been first given names in German since 1870. IFAG has decided, after comprehensive consultation with the Ständiger Ausschuß für geographische Namen and following its recommendations, to work according to the principle of "one object-one name" for published maps, other scientific publications and in this index. According to this principle, place-names should be referred to only in the language in which their original nomination was made. Names in German, derived by simple translation from other languages and listed in the first edition, have been deleted from the second edition. Those names dedicated to German-speaking participants or other personages during foreign expeditions, but in languages other than German, have also been deleted.

A-52460

Antarctic Science Advisory Committee (Australia), **Antarctic research priorities for the 1990s: a review,** [Canberra], Australia,, Dept. of the Arts, Sport, the Environment, Tourism, and Territories, 1991, 94p.

It is the view of the Antarctic Science Advisory Committee (ASAC) that Australia's antarctic research program should, in broad terms, be directed towards an understanding of the nature and evolution of Antarctica and the southern ocean and their role in the planet's environment, taking advantage of the special opportunities that derive from such understanding, and supporting the national interests and responsibilities in the region. To demonstrate Australia's antarctic commitment, this report provides 27 specific recommendations of actions to be taken in these research categories: research priorities; the antarctic natural environment; weather and climate; CCAMLR and the southern ocean ecosystem; environmental management; social sciences; technical support; and national and international awareness. The high priority geographical regions where these programs are to be accomplished include Casey, Davis, Mawson, and Macquarie Island Stations, with each location having a broad range of disciplines for study.

A-52532

Indreeide, T.V., **Antarctic science in a historical perspective: changing roles and functional development,** *International challenges,* 1990, 10(4), p.36-53, 2 refs.

The 20th century represents an eventful and dramatic era in the history of Antarctica. Man's conquest of the continent itself and the exploitation of the immense whale resources in the surrounding oceans became an impetus for the awakening of international interest in Antarctica at the beginning of this century. Scientific research and exploration of the continent and surrounding oceans has since been carried out to such an extent that it's often said that scientific knowledge is the greatest export item of Antarctica. In the last 30 years, this activity has taken place within the framework of the Antarctic Treaty, and coordinated by the Scientific Committee for Antarctic Research, SCAR. In this essay the presumed role of science in the historical processes in Antarctica is studied from its discovery up to the present. A general feature of this scientific activity has been to serve various purposes, i.e. economic, political and legal. The main aim of this article is to examine the interplay with other motives and interests, the power relationships between them and the importance of such interaction for the development of the region. (Auth. mod.)

A-52565

León, M., **Establishing a real-time video link to Antarctica,** *IEEE network,* Mar./Apr. 1995, 9(2), p.8-15.

On Nov. 24, 1992, NASA engineers implemented a real-time video link between McMurdo Station in the Antarctic and the continental United States. The problems encountered and the solutions developed in establishing a network in a harsh and isolated environment provide valuable insights into the conditions space explorers will encounter in planetary exploration. These efforts have enabled subsequent breakthroughs in technology applications, education, and telepresence. (Auth.)

A-52574

Hattersley-Smith, G., **History of place-names in the British Antarctic Territory,** British Antarctic Survey, Scientific reports, No. 113, Parts I and II, Cambridge, UK, British Antarctic Survey, 1991, 670p., Refs. p.622-664.

DLC QH199.B73 no.113, pts.1 and 2

There are 4350 officially accepted place-names in the British Antarctic Territory, and 1414 unofficial or redundant names in various languages have also been recorded, together with about 14,000 synonyms. Since 1945, the Antarctic Place-names Committee of the Foreign and Commonwealth Office has been responsible for providing advice on the adoption of place-names by the administrative authority for the Territory. The background to this Committee, its work and objectives are described, and some account is provided of the work of similar place-names authorities in other countries. A review is then given of the evolution of the place-names in the British Antarctic Territory as a result of voyages of discovery, sealing and whaling operations, and scientific and other expeditions, from the time of William Smith's voyage in 1819 to the present. After a consideration of principles in place-naming, the names are then treated systematically according to prescribed rules and listed alphabetically. (Auth. mod.)

A-52630

Argentina. Dirección Nacional del Antártico, **Antártida, Mar. 1980, No.10,** Buenos Aires, 1980, 60p., In Spanish.

DLC G845.A62

Aimed at the general reader, this issue discusses morphological and ecological features of antarctic birds and mammals; describes the importance of glaciological studies on that continent revealing the history of global climate; reviews some of the physical and mechanical properties of glaciers; and concludes with an article on antarctic paleobotany and its biogeographic implications.

A-52637

British Antarctic Survey, **Report of the British Antarctic Survey for the period April 1993 to 31 March 1994 (but reporting the full antarctic field season),** Cambridge, Natural Environment Research Council, [1994], 124p., Pubs. p.107-116.

General remarks are made concerning staff changes and activities in various divisions at BAS stations; personnel awards are announced; distinguished visitors, and British and international meetings attended, are listed. Logistic and operational activities are reviewed, including ship and air operations. A science strategy plan is presented; 5 principal and 2 minor "Science Themes" provide a framework for 21 research programs which are reviewed in detail and consist of the following: pattern and change in the physical environment of Antarctica; geological evolution of West Antarctica; dynamics of antarctic terrestrial and freshwater ecosystems; structure and dynamics of the southern ocean ecosystem; physics of solar-terrestrial phenomena from Antarctica; humans in isolated polar communities; and antarctic geographic information and mapping. Included are 4 appendices providing BAS' financial background, and lists of 1993 publications and staff in various locations, divisions and ships.

A-52638

New Zealand Antarctic Society, **Antarctic, Vol.13, No.8,** Christchurch, 1994, p.321-352.

Research activities and news items concerning New Zealand, Australia, Italy, Japan, Sweden and the United States cover the following: a geological study to be carried out on Alexander I., the demolition of Vanda Station, and a workshop on the recent environmental audit of the New Zealand Antarctic Programme; ANARE's plans for its 50th jubilee; the death of four Canadians in the crash of a plane mobilized for charter to the Italian National Antarctic program; Japanese use of four vessels to support oceanographic and marine geophysics work this season; the decision to defer for a year the joint Nordic expeditions to Antarctica (SWEDARP); and the continuation of USAP involvement in the Dry Valley programs. In the international section, CCAMLR agreement on the problem of seabird deaths caused by longline fishing is reviewed. In the Subantarctic, Inaccessible I. is to become a nature reserve; and a further attempt is to be made next year to recover the gold believed to have been aboard the *General Grant,* which was wrecked in 1866. Some general news deals with the stamp from Vanda and antarctic currency being produced in Canada.

A-52639

New Zealand Antarctic Society, **Antarctic, Vol.13, No.7,** Christchurch, 1994, p.277-320.

Research activities and news items concerning New Zealand, Australia, France, Italy, Jamaica, United Kingdom and the United States cover the following: strong emphasis on global questions in the New Zealand program; two Sikorsky S76 long range helicopters that will be used in the Australian summer program; France's decision to abandon plans to repair their airstrip near Dumont d'Urville Station; three ships to support the Italian program this season; second Jamaican antarctic expedition; the resignation of Dr. Drewry from BAS; and USAP studies of ozone and aspects of biology in McMurdo Sound. In the international section, further rounds of planning and preparation for the Cape Roberts project are outlined; ice sheet behavior and global changes were studied jointly by New Zealand and the United States; four British bases and one refuge on the Antarctic Peninsula are to be assessed for the U.K. Antarctic Heritage Trust. Illustrations and description of a new issue of Ross Dependency stamps are also presented.

A-52640

Melander, O., ed, Grönlund, E., ed, New Zealand Antarctic Society, **Swedish Antarctic Research Programme 1993/94; a cruise report,** Stockholm, Swedish Polar Research Secretariat, 1995, 96p., Refs. passim.

SWEDARP 1993-94 (Swedish Antarctic Research Programme) consisted of a variety of projects performed in four different geographical regions: Queen Maud Land, South Pole, Amundsen and Bellingshausen seas and South Georgia. This cruise report contains a preliminary account of a number of scientific studies that will be reported in detail in appropriate scientific journals. The aim of the report is to present an overview of what has been achieved. The main part of the SWEDARP 1993-94 expedition went to Queen Maud Land and the Swedish stations Wasa and Svea. A second party of SWEDARP 1993-94 went to the South Pole. The Antarctic Muon and Neutrino Detector Array (AMANDA) project was one of the 1993-94 expedition highlights for studying particles from outer space.

A-52641

Carlsson, M.L., ed, **Swedish Antarctic Research Programme 1992/93; a cruise report,** Stockholm, Swedish Polar Research Secretariat, 1995, 112p., Refs. passim.

The Swedish Antarctic Research Programme for 1992-93 comprised a variety of research projects in many different areas. This cruise report is a preliminary account of the research carried out and presents an overview of what has been achieved. Two Norwegian ships, M/S *Polarbjörn* and M/S *Lance,* were used to transport expedition members to and from Antarctica. Seven participants went to Queen Maud Land to carry out a terrestrial program at Svea Station. The marine program was coordinated on board M/S *Lance* in the southern Weddell Sea. In cooperation with Argentina, five Swedish scientists accomplished an expedition to James Ross I. and Vega I. to study glacial geology and palaeoclimatology. The Swedish antarctic program also worked in cooperation with BAS on South Georgia. Research activities have been performed in the fields of zoology, limnology and plant ecology. Two Swedish scientists joined the German ANTX/7 marine expedition in the Weddell Sea on board the R/V *Polarstern.*

A-52660

Everson, I., Paren, J., **Science in support of southern ocean fisheries management,** *NERC news,* Jan. 1995, No.31, p.28-29.

The CCAMLR Ecosystem Monitoring Programme is outlined, and BAS research in support of CCAMLR is described, including innovative acoustic techniques for quantifying distribution and biomass, and research into the population dynamics of seabird and seal species at Bird and Signy islands.

A-52661

Wade, M.C., Webb, J.W., Hedberg, W.H., **Use of drilling by the U.S. Antarctic Program,** *Oak Ridge National Laboratory. Technical report,* Aug. 1994, ORNL/TM-12809, 37p., DE94017744, Refs. p.35-36.

This report on drilling in the Antarctic has been prepared by the U.S. National Science Foundation (NSF) to assist principal investigators and others in complying with the National Environmental Policy Act (NEPA) and the Antarctic Treaty of 1961. In the United States, responsibility for compliance with these requirements rests with the NSF Office of Polar Programs (OPP), which manages the U.S. Antarctic Program (USAP). The USAP maintains three year-round stations on the continent to support scientific research. Research and associated support operations at these stations and camps sometimes involve drilling into ice, soil, or ocean sediments. In order to comply with NEPA and the Protocol, it is necessary for principal investigators and others to assess the environmental effects of drilling. This report describes various drilling technologies currently available for use in Antarctica, generally characterizing the potential environmental impacts associated with these drilling techniques, and identifying possible mitigation measures to reduce impacts.

A-52663

ANARE Club, **Aurora, Mar. 1995, Vol.14, No.3,** Melbourne, 1995, 32p.

The articles and news items in this issue deal with the following: ANARE happenings, including a new use of helicopters during the 1994-1995 season, and scientific and operational features; the ANARE Club and visitor programs; letters to the editor; the Oceans Policy program of the Antarctic Cooperative Research Center; the 2nd German South Polar Expedition; ANARE Club huskies raffle and other promotions; the British bases in the Antarctic Peninsula region; and, in the Collectors' Corner, Russian antarctic and arctic stamps.

A-52664

Centro Ricerca e Documentazione Polare, Rome, **Polar news/ Notizie polari, Vol.10, No.2,** 1995, p.8-13, In Italian and English.

This issue contains the following news items concerning Antarctica: research conducted on board the *Nathaniel B. Palmer* in the Bellingshausen and Amundsen seas in 1993; environmental problems on Saint Paul I.; BAS intention to close Faraday Station in 1996; milk composition of the southern elephant seal; surveying polar ice; meteorites collected in 1994 in Queen Alexandra Range and the Allan Hills; two successful Norwegian expeditions to the South Pole; and the calving of a giant iceberg off the antarctic continent.

A-52665

Centro Ricerca e Documentazione Polare, Rome, **Polar news/ Notizie polari, Vol.10, No.3,** 1995, p.14-20, In Italian and English.

This issue contains the following news items concerning Antarctica: the alliance between antarctic and space programs, the National Science Foundation and NASA; the vegetation studied in Granite Harbor, consisting of 8 species of mosses and over 30 species of lichens; the discovery of dinosaur remains on Mount Kirkpatrick; and the 6th Ecuadorian Antarctic Expedition.

A-52666

South Africa. Weather Bureau, **Newsletter/Nuusbrief, No.538, Jan. 1994,** 1994, 32p., Text and titles in Afrikaans or English.

South African research activities on Marion and Gough islands and at SANAE Station, along with general news items, are reported. Weather reports are presented with tables and graphs for the month of Jan. 1994.

A-52667

Council of Managers of National Antarctic Programs, **Report to the XIXth Antarctic Treaty Consultative Meeting,** Seoul, Korea, 1995, 8p.

This report to the XIX Antarctic Treaty Consultative Meeting is submitted on behalf of the Council of Managers of National Antarctic Programs (COMNAP) by its Chairman in accordance with the provisions of the Final Report of the XVIIIth ATCM. Pursuant to paragraph (42) of that report, the work of COMNAP since Apr. 1994 has been undertaken with a view toward participation in the detailed work of the Transitional Environmental Working Group. The annual meetings of COMNAP and its Standing Committee on Antarctic Logistics and Operations (SCALOP) were held Aug. 29 to Sep. 2, 1994, in Rome, Italy, in conjunction with SCAR XXIII. This report summarizes the results of those meetings.

A-52670

Gaździcki, A., Tatur, A., **New place names for Seymour Island (Antarctic Peninsula) introduced in 1994,** *Polish Polar Research,* 1994, 15(1-2), p.83-85, With Polish summary. 2 refs.

Seven new place names, with coordinates, are described here in alphabetical order. They have been introduced during the field work of the Argentine-Polish geological party on Seymour I. in the austral summer of 1993-94. A map and photographs are included. (Auth. mod.)

A-52671

Brazil. Comissão Interministerial para os Recursos do Mar, **Brazil in Antarctica** [O Brasil na Antártica], [1994], var. p., In Portuguese.

Four Brazilian antarctic operations, from 1983—when the Comandante Ferraz Station was built on King George I.—and 1986 are briefly reviewed. Aspects of the organizational structure of Brazilian operations in Antarctica, including logistic support by the Brazilian Navy, are outlined. Some ecological features are discussed and environmental protection is advocated.

A-52672

Antarctic Society of Australia, **Newsletter, No.29, June 1992,** Pymble, New South Wales, 1992, 24p., 11 refs.

The news items presented in this issue deal with the following: new fossil fish discoveries from south Victoria Land which help to correlate Devonian sequences in Australia; the conference "Asia in Antarctica" held in Hobart in Nov. 1992; and the report on Voyage 7, 1991-1992, by a representative of the Antarctic and Southern Ocean Coalition, including comments on various features of the voyage and recommendations for some improvements.

A-52673

Antarctic Society of Australia, **Newsletter, No.30, Sep. 1992,** Pymble, New South Wales, 1992, 20p.

The news items presented in this issue deal with the following: the implications of the recovery of leaves and wood in strata only 3 m.y. old and in the vicinity of the South Pole; the 2nd International Conference on Penguins; the update, country-by-country and as of July 1992, on the ratification of the Madrid Protocol; a salute to polar sled dogs; tracking of the Wandering Albatross in the Subantarctic; a report on the 44th International Whaling Commission meeting held in Glasgow in July, 1992; and the outline of the progress to date on construction of the airstrip at Dumont d'Urville Station.

A-52674

Antarctic Society of Australia, **Newsletter, No.38, Sep. 1994,** Pymble, New South Wales, 1994, 20p.

The news items presented in this issue deal with the following: the ASOC report on the 18th Antarctic Treaty Consultative Meeting; the availability of the BIOMASS data set and its supporting documentation, from BAS; tracking of Emperor Penguins across the pack ice; tourism in Antarctica in the 1993-1994 season; the U.S. Navy proposal to pull out of Antarctica, and how that would affect antarctic research; a workshop on human impacts in the Antarctic; the antarctic humpback whale catalog; the closing of the never-completed airstrip at Dumont d'Urville Station; and a USAP Observer Program summary of the 1993-1994 season.

A-52675
Antarctic Society of Australia, **Newsletter, No.39, Dec. 1994,** Pymble, New South Wales, 1994, 20p.

The news items presented in this issue deal with the following: the 1st joint conference of Australian and New Zealand professional conservators discussing preservation of antarctic historic sites; the international electronic database on antarctic research being established at the Antarctic Centre in Christchurch; an antarctic agreement between New Zealand and France; antarctic trips for tourists available by sea and air; the search for the wreck of a Spanish warship believed to have sunk near Livingston I. in 1819; and a scientific assessment of ozone depletion in 1994.

A-52676
Antarctic Society of Australia, **Newsletter, No.40, Mar. 1995,** Pymble, New South Wales, 1995, 20p.

The news items presented in this issue deal with the following: the report on SCAR Working Group on Biology, including subsidiary group reports and recommendations; an information brochure issued by NZAP on environmental protection; help needed for saving whales; the Antarctic Centre as part of Hobart redevelopment; environmental protection measures at the four Australian stations; comments from aboard the *Nathaniel B. Palmer* on winter pack ice; and an antarctic drilling program which could fill geological gaps.

A-52677
Australian National Committee for Antarctic Research. Australian Antarctic Division, **Australian antarctic and subantarctic research program. Report to the Scientific Committee for Antarctic Research No.35, 1993. April 1992-March 1993: record of activities; April 1993-March 1994: planned activities,** Kingston, Tasmania, 1993, 214p., Refs. p.175-188.
DLC QC807.6.A57A98b

Highlights of the program conducted from Apr. 1992 to Mar. 1993 in atmospheric sciences, biology, geosciences, glaciology, human biology and medicine, and oceanography are given. These are followed by details of specific projects, including title of project, names of participating investigators, location, project aims, field work conducted, significant findings and collections. The projected program for Apr. 1993-Mar. 1994 includes a description of observatory functions and outlines of projects in atmospheric sciences, biology, engineering, environmental studies, geodesy and geographic information, geosciences, glaciology, human biology and medicine, oceanography, and social sciences. An extensive bibliography, a glossary, and 3 appendices conclude this report.

A-52693
Palo, H., Jr., **Antarctica: Brazilian expeditions** [Antártida: expedições brasileiras], Rio de Janeiro, Cor/Ação, 1989, 143p., 26 refs.
DLC G860.P285

This is a collection of photographs and illustrations accompanied by a text describing antarctic land- and seascapes, climate, penguins, seabirds, whales and seals, submarine fauna and continental flora. Included is a review of the author's experiences in Antarctica and some aspects of the Brazilian Antarctic Program carried out on their ships, and at the Comandante Ferraz Station and refuges.

A-52709
New Zealand. Ross Dependency Research Committee (RDRC), **Report of the Antarctic Environmental Science and Monitoring Workshop, held on Wednesday 10 March 1993, Victoria University of Wellington,** [1994], var. p., Unpublished manuscript.

A summary record of the one-day Workshop proceedings includes discussions dealing with the antarctic environmental science and management, environmental monitoring, and a formulation of the Workshop's recommendations to the RDRC titled "New Zealand's priorities in Antarctica". A report by the SCAR-COMNAP ad hoc Planning Group on Antarctic Data Management, titled "Proposal for an antarctic data management system" is appended.

A-52710
Santiago de Chile. Instituto Antártico Chileno, [Boletín antártico chileno, Vol.13, No.1], May 1994, 52p., In Spanish. Refs. passim.

This bulletin reviews the following: 30 years of INACH's existence, its progress, establishments, administration and organization; national activities, including INACH's scientific research from 1964 to 1993, various programs, expeditions and relations with SCAR; international activities, including Chile's agreements with other countries in joint antarctic research programs; INACH's participation in COMNAP, SCALOP and RAPAL; a visit to Patriot Hills by 3 Chileans with a group of Canadian tourists; and miscellaneous news.

A-52711
Australia. Cooperative Research Centre for the Antarctic and Southern Ocean Environment. (Antarctic CRC), **Annual report, 1993/94,** Hobart, Tasmania, [1994], 47p.

The report describes the Antarctic CRC's research objectives, its structure and management, cooperative linkages, the aims and progress in southern ocean processes research, scholarships provided to students of the Institute of Antarctic and Southern Ocean Studies and to other higher degree students. The report also provides information on the Antarctic CRC's staffing and administration, publications, public presentations, public relations and communication, its grants and awards, performance indicators, its budget, research staff resources, and the audit report for the year ended June 30th, 1994.

A-52712
New Zealand. Ross Dependency Research Committee (RDRC), **Understanding the impact of human activity in Antarctica through multi-disciplinary research. Report on a joint Ross Dependency Research Committee/Foundation for Research, Science and Technology workshop on 5 May 1994 at the International Antarctic Centre, Christchurch,** May 1994, 15p.

This report covers the presentations and findings of a workshop sponsored by the Ross Dependency Research Committee and the Foundation for Research Science and Technology on May 5, 1994. This report has identified, from the open forum discussions, a list of management needs and a ranking of activities which fall under the heading of "Human Impact Research". It was not the purpose of the workshop to produce a research program on this subject. This document should, however, provide a basis for the science community to interact among themselves and with other disciplines to produce an interdisciplinary research package(s) which will address the environmental management needs of Antarctica. (Auth. mod.)

A-52713
Foundation for Research, Science & Technology, **Antarctica: research strategy for the Public Good Science Fund 1993/94 to 1997/98,** Wellington, New Zealand, Sep. 1993, 30p., 8 refs.

This paper begins by summarizing New Zealand's strategic directions for science and technology, the purpose and benefits of antarctic research, and the scientific opportunities and challenges. The antarctic research strategy is then outlined, along with more details on areas of research emphasis, indicative funding trends, logistics requirements and links to other research Output Classes. Material follows on relationships between the Foundation for Research, Science and Technology and other funding providers, on international relationships, on key competencies, and on databases. Annexes give background on the definition of Output 35 and the priority research themes, on 1992-93 PGSF research programs and providers in Output 35, on infrastructure/funders/providers of antarctic research and on the breakdown of the 1992-93 programs by area of research emphasis.

A-52715
Amos, A.F., **RACER: Racer Rocks,** *Antarctic journal of the*

United States, 1993, 28(5), p.159-161, 4 refs.

Among the many islands in the Gerlache Strait are a group of rocky islets that have now been officially named Racer Rocks. They are of interest to the RACER project as a site for an automatic weather station. This paper serves to introduce Racer Rocks with a brief overview of the physical, biological, and meteorological setting.

A-52776

U.S. National Science Foundation, **Antarctic journal of the United States, Vol. 29, No. 2,** Washington, D.C., U.S. National Science Foundation, 1994, 23p.

The issue begins with messages of encouragement from OPP Director Sullivan and Vice President Gore and continues with an extended summary of the 18th Antarctic Treaty Consultative Meeting activities and recommendations. The Meeting focused on tourism and the antarctic environment and included environmental protection guidelines for visitors and tour organizers. A resolution was made on a geographic name duplication when a recommendation was submitted to the U.S. Board on Geographic Names to make Taylor Dome the official name of the feature referred to as both Taylor Dome and McMurdo Dome. A brief account is given of a private Norwegian Expedition to the Shackleton Mountains during which one of the explorers fell into a crevasse where he died and from which he could not be removed. A historical note provides a discussion of the origin and usage of Gondwana and Gondwanaland. A pictorial essay shows the re-erecting of the Scott Memorial Cross on Observatory Hill following its dislodgement by persistently strong winds. More of antarctic geology unfolded as a fossil discovery was uncovered on Vega Island by a joint US/Argentina field party. The issue closes with rosters of the wintering personnel at the three stations and a listing of the NSF funding awards for antarctic projects between Dec 1, 1993 and Feb 28, 1994.

A-52857

Murray, M.D., **Scope of the series,** *Antarctic Society of Australia. Information brochure,* June 1993, No.1, p.1-4.

This introductory brochure describes the aim of these publications, which is to make some of the information obtained in antarctic research readily available. Accompanying this brochure is a map of Antarctica and the southern ocean, showing the location of the subantarctic islands and Antarctic Convergence. Maps of Macquarie and Heard islands with brief descriptions of the geographic and ecological features of each island are also presented.

A-52874

Wells, J.W., **Antarctic resources: a dichotomy of interest,** *Australian National University. Strategic and Defence Studies Centre. Working paper,* Nov. 1991, No.242, 28p., Refs. p.22-28.

DLC TN126.W45

This paper argues that there will be increasing demands to mine Antarctica: world demand for fossil fuels will increase; 'clean air' regulations (requiring the use of platinum group metal (PGM) technology to reduce fossil fuel emissions) will become more widespread; supplies of PGMs could be disrupted by political instability in current supplier countries; and countries both within and outside the Antarctic Treaty group might then renew pressures for mining to be allowed in Antarctica, despite the recently negotiated 50-year mining ban. Finally, the paper looks at the national security implications of this scenario for Australia and, more generally, discusses the increasing importance of economic and environmental considerations in national security assessments. (Auth.)

A-52876

Barrett, P.J., **Polar drilling workshop,** *New Zealand antarctic record,* 1988, 8(3), p.51-53.

DLC G845.A58

The first polar drilling workshop, involving 50 scientists from 7 countries held at Ohio State University Nov. 6-9, 1988 to develop recommendations on future antarctic drilling, is briefly discussed. SCAR was asked to endorse the scientific objectives (antarctic glacial history and tectonic evolution) and approve recommendations to further these. Another meeting was planned for July 1989 to consider specific proposals and administrative procedures. (Auth. mod.)

A-52882

Stroud, M., **Shadows on the wasteland,** London, Jonathan Cape, 1993, 182p., 12 refs.

DLC G850.F54S77

An account is given, in an almost novelized form, of the planning, logistics and personal experiences of the author's journeys to the poles in the company of one fellow traveler, Ranulph Fiennes. Medical aspects, such as diet, physiological and psychological effects on humans exposed to the harsh polar environment, and the interpersonal relationship between the two expeditioners, are discussed. The antarctic journey went from the Filchner Ice Shelf to Amundsen-Scott Station to the Ross Ice Shelf. The text is accompanied by numerous color photographs.

A-52959

Centro Ricerca e Documentazione Polare, Rome, **Polar news/ Notizie polari, Vol.10, No.4,** 1995, p.21-26, In Italian and English.

This issue contains the following news items concerning Antarctica: various research projects carried out at Mount Erebus recording the volcano's activities; sodar and its use in Antarctica; and the installation of automated geophysical observatories to begin operation at the end of the 1992-1993 season.

A-52962

Montevideo. Instituto Antártico Uruguayo, **Scientific activity 1986-1987, Vol.2** [Actividad científica 1986/87, Volumen No.2], Montevideo, Instituto Antártico Uruguayo, Jan. 1989, 87p., In Spanish with English summaries. Refs. passim. For individual papers see B-52965 through B-52968, E-52964 and I-52963.

DLC G845.A28

The publication includes 6 reports of investigations carried out at Artigas Station during 1986-1987 in the fields of meteorology, earth sciences, biology and medicine. Maps, charts and photographs are presented in 31 pages of the appendix.

A-52975

Scientific Committee on Antarctic Research, **SCAR bulletin No.117, April 1995,** *Polar record,* Apr. 1995, 31(177), p.271-284.

The 23rd meeting of SCAR, held in Rome, Italy, Sep. 4-9, 1994, is reviewed. Planning groups were established to implement the SCAR Global Change Programme, including research on the sea ice zone; paleoenvironmental records from the ice sheet and marine sediments; ice sheet mass balance and sea level; trace gases, aerosols, and UV radiation in the antarctic atmosphere; and biogeochemical cycles. SCAR recommendations included advance notice of planned research cruises; guidelines on overflights of bird colonies; protection of the Arrival Heights SSSI (Site of Special Scientific Interest) from electromagnetic noise; encouragement of the NASA mission for satellite laser altimetry of the antarctic ice sheet; precautions against contamination of a reported subglacial lake by ice core drilling at Vostok Station; removal of wastes from Antarctica instead of on-site incineration wherever possible; and discouragement of the reintroduction of captive-bred indigenous seals and penguins to prevent the unintended introduction of pathogens. Also included are lists of the officers and delegates, and financial reports.

A-52999

Beike, D.K., **Project engineering and project management of offshore petroleum development in the Ross Sea, Antarctica: an engineering-economic evaluation,** Austin, University of Texas, 1993, 272p., University Microfilms order No. 94-13440, Ph.D. thesis. Refs. p.253-272.

This study speculates about the viability of antarctic petroleum development and estimates when antarctic oil production will become economically feasible. The analysis is based on a hypothetical exploration and development model which could require a $7.6 billion investment in 1992 US constant dollars. Following a 20 year development period, a 30 year project producing an initial 144,000,000 bbl per year with a 5% decline rate is assumed. Exploration is based on a floating conical drilling unit. Production is based on a concrete Tension Leg Platform concept, with subsea completion. Storage will be in a seafloor facility and transportation will be by ice-breaking tankers. The Ross Sea was chosen as the most promising petroleum-producing area in the Antarctic, because it has the most promising sedimentary basins, has had the most scientific exposure, and is environmentally the most favorable area. The risk of this venture, with its large up front investment, spread over 20 years, makes it unlikely that such an operation will be economically feasible. (Auth. mod.)

A-53105
Korea Ocean Research and Development Institute, **Annual report 1991,** Ansan, Korea, 1991, 68p.

Research facilities of the Institute are described and antarctic research activities conducted mainly at King George I. from King Sejong Station are summarized. These included geological and geophysical surveys, meteorological data collection and oceanographic and biological investigations. King Sejong Station laboratory facilities and equipment are briefly described and the Polar Logistics Department activities carried out at the station in 1991 are outlined.

A-53106
Korea Ocean Research and Development Institute, **Annual report 1990,** Ansan, Korea, 1990, 71p.

Research facilities and 1990 activities at the Institute, including polar research conducted at King Sejong Station, are described. The latter included geological surveys, terrestrial geophysics, atmospheric physics, biology, oceanography, and meteorology. The function and operations of the Institute's Polar Logistics Department, which provides supporting services for Korea Antarctic Research Program and the operation of King Sejong Station, are outlined.

A-53112
Hall, C.M., ed, Johnston, M.E., ed, **Polar tourism. Tourism in the arctic and antarctic regions,** Chichester, John Wiley & Sons, 1995, 329p., Refs. passim. For selected papers see A-53113 through A-53121.
DLC G155.P713P65

Nine chapters of this 17-ch. book deal with tourism in Antarctica, discussing issues in antarctic tourism, its precursors, its regulations, and its impacts and management, both on the continent as well as on the subantarctic islands.

A-53113
Hall, C.M., Johnston, M.E., **Introduction: Pole to Pole: Tourism issues, impacts and the search for a management regime in polar regions,** Polar tourism. Tourism in the arctic and antarctic regions, edited by C.M. Hall and M.E. Johnston, Chichester, John Wiley & Sons, 1995, p.1-26, Refs. p.23-26.
DLC G155.P713P65

This is an introduction to a book which provides a number of chapters each looking at specific aspects of tourism in the northern and southern polar regions. A number of common themes run through each chapter, identifying the need for appropriate tourist management regimes in polar regions and the sensitivity of the polar environments, but also clarifying the substantial differences which exist in the political/legal regimes which regulate tourism, in the spatial patterns of tourist visitation, in the economic impacts of tourism, and in the presence of indigenous and resident populations in the northern polar region.

A-53114
Hall, C.M., Wouters, M., **Issues in antarctic tourism,** Polar tourism. Tourism in the arctic and antarctic regions, edited by C.M. Hall and M.E. Johnston, Chichester, John Wiley & Sons, 1995, p.147-166, Refs. p.163-166.
DLC G155.P713P65

Tourism is now recognized as a legitimate antarctic activity. However, there is substantial debate over the appropriate means by which tourism should be controlled and managed at both the macro and micro planning and policy levels. This chapter introduces the reader to some of the issues surrounding the development of antarctic tourism and the search for an appropriate management regime. (Auth.)

A-53115
Codling, R.J., **Precursors of tourism in the Antarctic,** Polar tourism. Tourism in the arctic and antarctic regions, edited by C.M. Hall and M.E. Johnston, Chichester, John Wiley & Sons, 1995, p.167-177, 18 refs.
DLC G155.P713P65

This chapter outlines the main events that have contributed to the development of antarctic tourism. Individually, their influence may not have been great, but they combined to demonstrate the growing interest in visits to the southern continent. Following a brief consideration of motives for travel, the first confirmed tourist visit to Macquarie I. is examined.

A-53116
Enzenbacher, D.J., **Regulation of antarctic tourism,** Polar tourism. Tourism in the arctic and antarctic regions, edited by C.M. Hall and M.E. Johnston, Chichester, John Wiley & Sons, 1995, p.179-215, Refs. p.211-215.
DLC G155.P713P65

This chapter examines the response of the Antarctic Treaty System to tourism issues; it reviews the role of the Madrid Protocol in regulating tourism and the role of the International Association of Antarctic Tour Operators; it discusses the limitations of current regulatory measures for antarctic tourism and the challenge to policy makers; and it proposes some possible actions to address some issues that need special attention if Antarctica is to be adequately protected.

A-53117
Stonehouse, B., Crosbie, K., **Tourist impacts and management in the Antarctic Peninsula area,** Polar tourism. Tourism in the arctic and antarctic regions, edited by C.M. Hall and M.E. Johnston, Chichester, John Wiley & Sons, 1995, p.217-233, Refs. p.232-233.
DLC G155.P713P65

Project Antarctic Tourism is monitoring current trends in antarctic tourism, and drawing parallels with other forms of world tourism to which it might ultimately conform. Tourism elsewhere is generally welcomed and catered for by an infrastructure of parks, reserves, information centers, and promoting tourist boards and authorities that see the industry as a legitimate use of natural resources. Not so in Antarctica, for the governing Antarctic Treaty is dedicated to conservation and science. Nevertheless tourism is there, growing and diversifying, and shows signs of developing in ways parallel to those already seen in the Arctic, where facilities ashore are commonplace. Lack of management control has resulted in diffusion, with tour operators free to land passengers almost anywhere, and no management strategies available for any landing site.

A-53118
Hughes, J., Davis, B., **Management of tourism at historic sites and monuments,** Polar tourism. Tourism in the arctic and antarctic regions, edited by C.M. Hall and M.E. Johnston, Chichester, John Wiley & Sons, 1995, p.235-255, Refs. p.253-255.
DLC G155.P713P65

Given the increased tourism on the antarctic continent and associated subantarctic islands, it is a matter of urgency that management strategies for historic huts and other cultural sites be developed. This chapter provides suggestions as to the documentation, conservation and interpretation of historic sites and monuments, stressing the value of multidisciplinary approaches to evaluation, and proposes forms of international collaboration. The chapter also discusses pragmatic measures for dealing with tourism, such as guided tours, the role of operators, on-site interpretation and visitor surveys.

A-53119
Wouters, M., Hall, C.M., **Managing tourism in the sub-Antarctic islands,** Polar tourism. Tourism in the arctic and antarctic regions, edited by C.M. Hall and M.E. Johnston, Chichester, John Wiley & Sons, 1995, p.257-276, Refs. p.275-276.
DLC G155.P713P65

Although the subantarctic islands are sovereign territories, the management strategies brought to bear in visitor management are still relevant to the antarctic situation and to the broader issues of tourism management in polar regions. This chapter examines the nature of subantarctic tourism, its impacts and management. The chapter is divided into four main sections: a discussion of the problems in defining what constitutes the subantarctic; an examination of the impacts of tourism on the subantarctic islands; and an overview of the tourism policies and management strategies which have been put in place to control visitation in the various subantarctic territories. The chapter concludes with a discussion of the subantarctic tourism management regime and its future prospects in the light of increased tourist visitation.

A-53120
Wouters, M., Hall, C.M., **Tourism and New Zealand's sub-Antarctic islands,** Polar tourism. Tourism in the arctic and antarctic regions, edited by C.M. Hall and M.E. Johnston, Chichester, John Wiley & Sons, 1995, p.277-295, Refs. p.293-295.

DLC G155.P713P65

This chapter discusses the unique values of the New Zealand subantarctic islands and their attractiveness to visitors. Past human impact and present New Zealand efforts to protect the islands from further human modification are discussed. Management guidelines for tourism are reviewed with a discussion of their potential as a model for management of the subantarctic islands. The chapter concludes by discussing the implications of sustainable forms of tourism for management in the New Zealand subantarctic islands.

A-53121
Johnston, M.E., Hall, C.M., **Visitor management and the future of tourism in polar regions,** Polar tourism. Tourism in the arctic and antarctic regions, edited by C.M. Hall and M.E. Johnston, Chichester, John Wiley & Sons, 1995, p.297-313, Refs. p.311-313.

DLC G155.P713P65

Tourism in polar regions has grown substantially in recent years, and will continue to grow. In the Antarctic and Subantarctic, the authors expect increasing numbers and visitor pressure at existing sites, and perhaps the development of new locations for shore visits. The Antarctic Peninsula and surrounding islands will continue to be the focal point for tourism in the Antarctic. However, the Ross Sea area will receive a gradual increase in tourist traffic to and from Australia and New Zealand. The development of circumpolar tourism in the antarctic ocean will also place pressure on subantarctic islands and parts of the antarctic continent which have received little previous tourist visitation. In addition, increased demand for antarctic tourism experiences may well see the recommencement of commercial flights from Australia and New Zealand.

A-53141
Centro Ricerca e Documentazione Polare, Rome, **Polar news/ Notizie polari, Vol.10, No.5,** 1995, p.27-33, In Italian and English.

This issue contains the following news items concerning Antarctica: discovery of fossil remains of a giant mollusc and an oversized armadillo on Seymour I.; the construction of a station for deep ice coring on top of Dome Fuji; and the biochemical protection of some antarctic species from UV exposure.

A-53180
Vidas, D., **Antarctic tourism: a challenge to the legitimacy of the Antarctic Treaty System?,** *Fridtjof Nansen Institute. International Antarctic Regime Project. IARP publication series,* 1992, No.6, 35p., 200 notes and refs.

The criteria for assessing the legitimacy of the Antarctic Treaty System (ATS) as an international regime are established, and the correlation between antarctic tourism and the legitimacy of the ATS is examined. It is concluded that the adaptation of the ATS to recent challenges posed by antarctic tourism, which are described, has not resulted in any institutional changes within the ATS.

A-53181
International Antarctic Regime Project (IARP), **International Antarctic Regime Project publication series 1992. Executive summary,** *Fridtjof Nansen Institute. International Antarctic Regime Project. IARP publication series,* Nov. 1992, 9p.

The Fridtjof Nansen Institute and its research on antarctic law and politics are discussed, and the International Antarctic Regime Project (IARP) is described. Included are summaries of six reports published in the IARP publication series in 1992.

A-53186
Santiago de Chile. Instituto Antártico Chileno, **Boletín Antártico Chileno, Vol.14, No.1,** May 1995, 48p., In Spanish. Refs. passim. For selected papers see A-53190, D-53188, E-53189 and G-53187.

This bulletin reviews the following: conflicts of interest in the use of Antarctica; the official proclamation of the Madrid Protocol as national law in Chile; the acquisition of the first Chilean icebreaker; the inauguration of the Profesor Julio Escudero Base on Fildes Peninsula; INACH's activities at the South Pole during the 1994-1995 summer season; the activities of the 31st Chilean Scientific Antarctic Expedition; new discoveries of fossil plants on Snow I., activities at the antarctic meteorological station Presidente Frei; and a five-year plan of scientific and technological antarctic activities, 1995-2000.

A-53190
Five-year plan of scientific and technological antarctic investigation for 1995-2000 [Plan quinquenal de investigación científica y technológica antártica, 1995-2000], *Boletín Antártico Chileno,* May 1995, 14(1), p.42-47, In Spanish.

After a review of Chile's involvement in antarctic research over the last 30 years, including fields of research and the chronology of station-building and related logistics, a five-year plan for future research is outlined. Described are general and specific objectives of the plan, national strategy, the scientific programs, the projected annual activities, funds, logistic support, and administration.

A-53229
Comerci, S.M., **Recovery and restoration of historic sites and remains of the Swedish Antarctic Expedition of 1901-1903** [Arqueología histórica en Antártida: recuperación y conservación de restos y sitos históricos en la Expedición Antártica Sueca del Dr. Nordenskjöld (1901-1903)], *Il polo,* Mar. 1994, Vol. 1, p.29-32.

The activities undertaken by the Argentine Antarctic Institute related to the restoration of the Snow Hill hut, used during the 1901-1903 Swedish Antarctic Expedition, are reviewed. A description of the hut and a sketch of the building, along with a list of materials recovered in it, are given.

A-53240
Tollefsen, I.E., **Queen Maud Land, Antarctica** [Dronning Maud Land Antarktis], Oslo, Mortensen Bokforlag, 1994, 160p., In Norwegian.

DLC GV199.44.D76.T65

After a historic review of the discovery of, and the early expeditions to Antarctica, a description is given of a climbing expedition to "Norway's highest peak" and to the spire "Wolf's Tooth" in the Norwegian sector of Antarctica. The text, accompanied by numerous color photographs and a map, illustrates and gives details of the beauty, as well as hardships, of the adventure.

A-53244
ANARE Club, **Aurora, June 1995, Vol.14, No.4,** Melbourne, 1995, 32p., For selected papers see F-53246 and G-53245 or 49-5857 and 49-5858.

The better part of this issue covers the Lambert Glacier Basin Traverse, including logistics and operational aspects and extracts from the official report on ice radar digital recording, data processing and results from the traverse project. A section titled ANARE happenings includes highlights of the major scientific achievements for 1994-1995 and outlines for the 1995-1996 ANARE season program. An article by M. Kirton, ANARE's Editor, recalling events related to his visits to Antarctica, and an article on a new dictionary of antarctic English, conclude this issue.

A-53255
Dupuy, R.J., ed, Vignes, D., ed, **New law of the sea treaty** [Traité

du nouveau droit da la mer], Collection "Droit international", Paris, Economica, 1985, 1447p. (pertinent p.463-496), In French.

DLC JX4421.T72

Article 234 of the Law of the Sea Convention of 1982, which deals expressly with polar regions, is reviewed in Ch.10 of this volume. Geographic and climatic differences between the poles are described, and issues such as sea water pollution, territorial sovereignties and jurisdictions, economic zones and resource exploitation, are addressed. The effectiveness of the Antarctic Treaty in providing protection of marine environments is examined, and pertinent articles of the Treaty are cited.

A-53319
Davis, P.B., **Antarctic visitor behaviour: are guidelines enough,** *Polar record,* July 1995, 31(177), p.327-334, 22 refs.

The general pattern of antarctic tourism is well known and can be described in terms of numbers of visitors, landing sites, and general activities. However, little is known about the visitors, their behavior, and other user characteristics. Such information is vital for planning effective visitor-management strategies. This article presents and discusses some results from a 1993-94 questionnaire conducted aboard three IAATO (International Association of Antarctic Tour Operators) member ships and focuses on how visitors rated the behavior of themselves and others vis-à-vis the IAATO voluntary visitor guidelines. It also identifies how sex, age, educational level, and ship affect guideline violation or adherence. Additionally, passenger responses to hypothetical violations are discussed, which may help to explain why violations occur. This paper stresses not how many violations occur, but why they occur, providing a new insight for future visitor management. (Auth.)

A-53320
Scientific Committee on Antarctic Research, **SCAR bulletin No.118, July 1995,** *Polar record,* July 1995, 31(177), p.363-372.

This bulletin contains the summary reports of the working groups to the 23rd meeting of SCAR, Rome, Italy, Sep. 4-9, 1994. There were five working groups: Biology; Geodesy and Geographic Information; Geology; Glaciology; and Physics and Chemistry of the Atmosphere. Concerns were expressed by the Working Group on Biology that drilling could contaminate a subglacial lake at Vostok Station, and by the Working Group on Glaciology that drilling at Vostok, which has now reached a depth of over 2500 m, could be discontinued due to logistic problems with the oversnow traverses from Mirnyy. Recommendations by the working groups for future databases, coordination of existing research programs, and future research programs are also included.

A-53420
Higham, T., ed, **New Zealand's subantarctic islands: a guidebook,** [Wellington, N.Z.], Department of Conservation, 1991, 71p., 29 refs.

DLC QH197.5.N49

New Zealand's five subantarctic island groups, protected by law as a nature reserve, are described, with information about their attractions and a list of codes as guidelines to accommodate tourism with minimum risk and disturbance to the environment.

A-53421
Harrowfield, D.L., **Archaeology of Borchgrevink's stores hut, Cape Adare, Antarctica,** *New Zealand journal of archaeology,* 1991, Vol.13, p.177-197, 26 refs.

DLC DU416.N33

In 1990, a new cladding was fitted to the roof of Borchgrevink's 'living hut' and the contents of the 'stores hut' were excavated. Artefacts were preserved as a result of snow accumulating in the unroofed structure. Data obtained from the excavation support use of the storage hut for temporary accommodation by members of an expedition which wintered at Cape Adare in 1911. Improvised sleeping platforms and evidence for partitioning and heating of the hut were found. (Auth.)

A-53422
Ritchie, N.A., **Polar excavation techniques and technology,** *New Zealand journal of archaeology,* 1989, Vol.11, p.101-115, Refs. p.113-115.

DLC DU416.N33

Major archaeological excavations have been conducted at Scott's 1910-13 expedition hut site at Cape Evans, Ross I., Ross Dependency over the past three years. The work has involved experimentation and the use of a wide range of equipment for excavating in ice and permafrosted ground and to deal with specific problems encountered during archaeological fieldwork in a frozen environment such as Antarctica. The equipment, its operation, and advantages and disadvantages are described. (Auth.)

A-53437
Poupin, M., Burgos, L., **Antarctic urban development: ice-free as an extremely natural resource,** International Design for Extreme Environment Assembly, 2nd, Montreal, Oct. 24-27, 1993. Growth and Environment: challenging extreme frontiers; IDEEA Two conference proceedings, Montreal, Canada, 1994, p.46-52.

Through half a century of human history in Antarctica, most settlements have been located in coastal and insular areas. Land is a critical variable for urban development in any latitude. In Antarctica, this feature becomes an extremely limited resource, since it is only 5% of the 14 million sq km of surface. At a regional and urban level, this paper discusses and analyzes the antarctic territorial occupation process and ice-free land current situation, regarding some of its paradoxical features. It has no exchange value, as it is nobody's property; land profit does not determine the location of activities in the area, as it does in any other latitude; there is a competition between antarctic biota and human settlements to locate themselves within the same areas; and although all antarctic human settlements may look quite similar, there are important differences in the way nations have "imported" their cultures to Antarctica and built them into this very fragile natural environment. (Auth.)

A-53443
Rudge, C., ed, **New Zealand activities in Antarctica, 1987-1988,** *New Zealand antarctic record,* 1988, 8(2), 64p., Refs. passim.

DLC G845.A58

This edition of the New Zealand antarctic record contains short reports on research at, or near, the Scott Base concerning antarctic birds, seismic exploration, snow accumulation, fast ice, psychological evaluation of wintering-over personnel, and expeditions and a publication list of the University of Canterbury Antarctic Research Unit. In addition, abstracts are presented of the 1987-1988 New Zealand activities in Antarctica, covering such disciplines as biology, geology, meteorology and glaciology.

A-53513
BGR Bundesanstalt für Geowissenschaften und Rohstoffe, **Biennial report 1989/1990** [Tätigkeitsbericht 1989/1990], Hannover, Germany, 1991, 207p. (Pertinent p.148-156), In German and English.

The report provides a bilingual exposition of German geological surveying activities in northern Victoria Land, the Ross Sea, the Riiser-Larsen Ice Shelf region off the coast of Antarctica, and the east coast of Greenland centered on 80°N. The antarctic focus is on the crust thickness below the Transantarctic Mountains and the seismology/tectonics below the Ross Sea. The arctic phase accents the submarine geology and glacial deposits off the northeast Greenland coast.

A-53515
U.S. National Science Foundation, **Antarctic journal of the United States, Vol.28, No.3,** Washington, D.C., Sep. 1993, 32p.

More than 120 individual projects are being undertaken in NSF's 37th antarctic research season. Sketches of the principal focus of these projects are provided, the project title is given and the investigators and their affiliations are identified. The broad range of research topics testifies to the equally broad interests of the participating scientists. As is customary, summaries of grant awards for the period Mar. 2 to May 31, 1993 and of weather conditions at McMurdo, Palmer, and Amundsen-Scott Stations for May, June, and July 1993 close out the issue.

A-53516
U.S. National Science Foundation, **Antarctic journal of the**

United States, Vol.28, No.1, Washington, D.C., Mar. 1993, 24p.

The 1992 report of the Commission on the Future of the National Science Foundation on the changing role of science and engineering *vis à vis* society begins the issue. This is followed by an account of the 17th Antarctic Treaty Consultative Meeting, including the full texts of the four recommendations plus the Annex to recommendation XVII-2, the management plan for SPA No.1, Taylor Rookery in Mac.Robertson Land. A report of a helicopter crash which resulted in the deaths of three and injuries to two others reemphasizes the peril which is always nearby in Antarctica. Other reports include those on evidence of an ancient antarctic forest; of the UV radiation network; a student space analog design competition; sediments on the Maar Ice Piedmont; a C-130 medical mission to SANAE from McMurdo; the obituary of Dr. William J. Campbell; and the establishment of a marine organism photo library at the Crary Lab. A listing of the funding awards for the period Oct. 1 through Nov. 27, 1992 and the weather instrumentation measurements at McMurdo, Palmer, and Amundsen-Scott Stations for Nov. and Dec. 1992 and Jan. 1993 close the issue.

A-53523

New Zealand Antarctic Society, **Antarctic, Vol.13, No.10,** Christchurch, 1995, p.398-428.

Research activities and news items concerning New Zealand, Belgium, Brazil, Bulgaria, Australia, the United Kingdom and the United States are discussed in this issue. Also covered is a report on the 19th Antarctic Treaty Meeting, the legal basis for the southern ocean sanctuary, and some general news, including Greenpeace's 9th expedition and various commemorative ceremonies.

A-53527

Centro Ricerca e Documentazione Polare, Rome, **Polar news/ Notizie polari, Vol.10, No.6,** 1995, p.34-39, In Italian and English.

This issue contains the following news items pertinent to Antarctica: new electronic equipment to obtain data on foraging habits of birds and mammals; a method to improve the binding process of snow grains in ice- or snow construction; a recent census of penguin populations on the Antarctic Peninsula and the South Shetland Is.; sea ice; a study on the rising water level of Lake Vanda; and the use of special fluids to prevent the closure of boreholes.

A-53533

New Zealand Antarctic Society, **Antarctic, Vol.13, No.9,** Christchurch, 1995, p.354-396.

Research activities and news items concerning New Zealand, France, Italy, India, South Africa and Switzerland cover the following: equipment delivered to Cape Roberts in preparation for an international drilling program to be started in 1996; personnel and projects at Scott Base this winter; New Zealand's ratification of the Madrid Protocol and the signing of a cooperative agreement with Switzerland for antarctic research; the French and Italian agreement to build and operate a scientific station at Dome C, and an outline of planned programs; a review of the first decade of Indian activities on Antarctica; the closing of SANAE III and construction of SANAE IV; and the closing of the meteorological station on Campbell I. Some general news deals with a wreck found at Possession I. and a short article concerning the calving of a new giant iceberg off the Antarctic Peninsula.

A-53539

Galimberti, D., **Antarctica: an introductory guide,** Miami Beach, Zagier & Urruty, 1991, 143p., Refs. p.141-143.

DLC G860.G29

The aim of this introductory guide is to provide a comprehensive view of the past, present and future of Antarctica, as far as its geography, geological evolution, biology, history, environment and legal and economic aspects are concerned. It is intended to offer to anyone wishing to acquire a basic knowledge of Antarctica, without needing a scientific or technical background, the foundation for a better understanding of the reality behind its evocative name, and a consideration of the reasons why it has become the object of so much interest on a world scale.

A-53541

Roberts, C.A., Lynch, J.T., Chiang, E., **United States Antarctic Program,** *Society of Automotive Engineers. SAE technical paper series,* 1994, No.941609, 8p., Prepared for the International Conference on Environmental Systems, 24th, Session ES08, Friedrichshafen, Germany, June 20-23, 1994. 5 refs.

The National Science Foundation (NSF) has responsibility for the management, funding, and operation of the United States Antarctic Program (USAP), the U.S. national research program in Antarctica. The program is multifaceted, having international obligations under the Antarctic Treaty, providing grantees funding for antarctic scientific research, and providing the necessary operational and logistical support to researchers to execute their programs. The latter includes building, maintaining, and operating all research stations, camps, and other facilities, and operating two research vessels, ski-equipped C-130 aircraft, and helicopters. In the 1993-94 season, several challenging science projects were conducted. Astronomy and astrophysics efforts among these included projects under CARA (Center for Astrophysical Research in Antarctica) and AMANDA (Antarctic Muon and Neutrino Detector Array). These two examples are in the initial stages of their work, and will continue for some time. The paper describes CARA and AMANDA, and the logistics and operational support that are required to sustain them. Long-duration ballooning experiments, where large balloons circumnavigate the antarctic continent for up to two weeks at a time, are also discussed. In some cases, these give astrophysical data comparable to data obtained from space shuttle flights. (Auth. mod.)

A-53542

Roberts, C.A., Jatko, J.A., Lynch, J.T., Rand, J.H., **1994-1995 antarctic field season,** *Society of Automotive Engineers. SAE technical paper series,* 1995, No.951657, 7p., Presented at the International Conference on Environmental Systems, 25th, San Diego, California, July 10-13, 1995. 17 refs.

The principal expression of U.S. presence in Antarctica is through science. Hence, the United States Antarctic Program (USAP) is run by the National Science Foundation. In the austral summer of 1994-95 (Oct.-Feb.), the Program supported approximately 120 science projects involving 640 scientists and technicians. This paper highlights some of the recent accomplishments at Amundsen-Scott Station and discusses the need and prospects for a new station there. It also discusses some successes in the USAP waste management program. (Auth.)

A-53549

New Zealand. External Assessments Bureau, **Information on the 40th Russian Antarctic Expedition (1994-1996),** Wellington, May 1995, 15p. + appends., EAB 28/95, Translation of the 1995 official report of the Russian Federal Service for Hydrometeorology and Environmental Monitoring, Moscow, offered in accordance with provisions of the Antarctic Treaty.

This is a translation of the annual report on antarctic activities, 1994-1996, provided by Russia in accordance with its obligations under the Antarctic Treaty, and published by the New Zealand External Assessments Bureau. Reported are the routes, names, types, numbers and armaments of ships and aircraft sent to the Antarctic, including information about military equipment and its location; names, location and dates of opening of stations established or planned; personnel data; the research projects carried out, or planned, at each of the stations and seasonal bases, on board each research vessel and aircraft and the region encompassed by the program; instruments and equipment used; means of transportation and communication equipment in use; emergency and medical facilities; land shelters available; number and types of animals collected for scientific research; isotopes used; research rockets used; information on ships carrying out oceanographic research programs; waste removal policy; and information on radio equipment and schedules of radio links for all Russian stations in Antarctica.

A-53550

Argentina. Dirección Nacional del Antártico, **Ten years of antarctic investigations** [Diez años de investigaciones antárticas], Buenos Aires, Instituto Antártico Argentino, 1995, 73p., In Spanish.

A list is presented of more than 800 citations of papers published in national and foreign journals, resulting from antarctic research carried out by scientists of the Instituto Antártico Argentino in cooperation with other participating organizations, during the period 1985-1994. The citations are grouped by areas of interest as follows: Human biology, medicine and psychology; atmospheric, biological, marine and Earth sciences; history; geopolitics, and environment.

A-53551

Prosser, R., **Power, control and intrusion, with particular reference to Antarctica,** Just environments; intergenerational, international and interspecies issues. Edited by D.E. Cooper and J.A. Palmer, London, Routledge, 1995, p.108-120.

DLC GE105.J87

After illustrating how the concept of individual and communal ownership underpins all issues concerning the environment and human relationships to it, the author discussed the uniqueness of Antarctica. It is pointed out that, alone of all the continents, Antarctica is a genuine wilderness, nurturing no established indigenous peoples with communal or individual rights, which makes it vulnerable and "up for grabs" by acquisitive societies without raising issues concerning conquest and colonialism. This leads to a discussion of territorial claims, exploration and exploitation of resources, tourism, the impact on the environment and the effectiveness of the Antarctic Treaty and the Madrid Protocol in providing environmental protection in Antarctica.

A-53552

Antarctic Society of Australia, **Newsletter, No.36, Mar. 1994,** Pymble, New South Wales, 1994, 20p.

The news items presented in this issue deal with the following: a report on the Southern Ocean Whale Sanctuary Symposium held in Sydney on Feb. 16, 1994; a new stamp issue which pays tribute to the contribution of huskies in the Australian Antarctic Territory; a tidal wave which has wrecked a new airstrip at the Dumont d'Urville Station; an experiment by Australian astronomers at the South Pole Observatory; plans for the first International Conference on the Biology and Conservation of Albatrosses; albatross banding; the completion of an extended antarctic trek by two Australians; a report of the 1992-1993 British Antarctic Survey activities; the stopping of an ice stream in the West Antarctic Ice Shelf; and the rescue of three members of a four-person Norwegian expedition which had suffered one fatality.

A-53559

Australian National Antarctic Research Expeditions, **New directions for ANARE. The 1994-95 season,** *ANARE News,* Autumn 1995, No.75, 64p.

The feature section of this issue presents highlights of the Australian 1994-1995 antarctic program; an outline of the coming activities in 1995-1996; details of the Lambert-Amery Regional Glaciology Experiment 1994-1995 traverse; a review of investigations of antarctic bottom water physics and chemistry carried out on board the *Aurora Australis*; an account of ANARE's visit to Balleny Is. and a geoscience voyage which began the 1994-1995 ANARE summer season. The science, environment and operations sections cover biological and oceanographic research, environmental protection issues, and activities at the 4 Australian antarctic stations. General news, news in brief, publications, meetings, and Jan.-Mar. 1995 weather at the 4 stations conclude this issue.

A-53565

Antarctic journal of the United States, vol.28, no.4, Washington, D.C., U.S. National Science Foundation, 1993, 23p.

Status reports of on-going projects give these updates: a new collection network of remotely sensed sea ice data provides swift availability of ice conditions for ship operations; an October 1993 report shows ozone losses over the South Pole and subsequent increased levels of UV radiation. Instrumented balloons provided additional data; progress of the NSF long-term ecological research program (LTER) is reported along with the continuing research in the McMurdo Dry Valleys; volcanic activity under the ice streams of West Antarctica; the astrophysical research effort at the South Pole Observatory to discover the early structure of the universe; the University of Washington studies of climate processes over the Antarctic Plateau; letters debating the ancient antarctic forests; opening of a joint NSF, USGS, University of Colorado ice core laboratory in Lakewood, CO; NSF grant awards for the period 1 June through 31 Aug.; weather summaries at McMurdo, Amundsen-Scott, and Palmer Stations for Aug./Sep./Oct. 1993.

A-53566

Antarctic journal of the United States, vol.29, no.1, Washington, D.C., U.S. National Science Foundation, 1994, 23p.

This issue of the AJUS provides an array of unusual kinds of report topics, starting with the Dry Valleys rock microorganism display at the Smithsonian Institution and continuing with the hydroponic gardening experiment at McMurdo and Amundsen-Scott Stations; a series of four reports of the *Nathaniel B. Palmer* ice activities in the Bellingshausen and Amundsen Seas; the ANZFLUX experiment studying winter interactions between the atmosphere, ice, and waters above, atop, and within the Weddell Sea; a set of newsbriefs from The Ice; and an *Ave et Vale* to the U.S. Naval Construction Battalions (Seabees) who, after a long and honorable participation, will no longer be a major player in the antarctic adventure. A list of NSF funding awards for the period Sep. 1 through Nov. 30, 1993 is included.

A-53567

Antarctic journal of the United States, vol. 29, no.3, Washington D.C., U.S. National Science Foundation, 1994, 31p.

Several brief paragraphs highlight individual projects scheduled for the 1994-1995 summer season. On tap are four live telecasts via satellite from the ice; a new submillimeter telescope at South Pole; a robot ice edge explorer; ice core libraries; sub-ice sheet geophysics; a Ross Sea polynya; Lake Vanda chemistry and biology; and microalgae living in the sea ice at the edge of McMurdo Sound. These are followed by summaries of individual projects with principal investigators and their affiliations identified. The projects cover a wide spectrum of disciplines including biology and medicine, geology and geophysics, glaciology, ocean studies, climatology, astronomy and astrophysics, and ozone depletion. Nearly 500 scientists are involved in about 90 projects. A listing of NSF funding awards for the period Mar. 1 through May 31, 1994 concludes the issue.

A-53575

Scientific Committee on Antarctic Research, Working Group on Solar Terrestrial and Astrophysical Research. Working Group on the Physics and Chemistry of the Atmosphere, **STAR/PACA Newsletter, No.4,** Nov. 1993, p.1-9.

This issue of the Newsletter deals with the following: a report on the Rome AGONET Steering Committee meeting, including information on the structure of ADAF, the rules of the road for data usage, and data products expected of ADAF; a report on the Rome AGONET Workshop during 1994 SCAR meeting; an article on the Joint Working Group on Antarctic Research (WG-ANT) activities at the 7th Scientific Assembly, including a symposium on the correspondences and contrasts in geophysical phenomena in the polar regions, and details of the WG-ANT business session.

A-53576

Centro Ricerca e Documentazione Polare, Rome, **Polar news/ Notizie polari, Vol.10, No.7-8,** 1995, p.40-45, In Italian and English.

This issue contains the following news items concerning Antarctica: scientists and personnel suspend wintering-over activities at SANAE; the British Antarctic Survey hands over Faraday Station to Ukraine; automation of the meteorological station at Campbell I.; a summary of India's first decade of activities in Antarctica; Inaccessible I. to become a natural reserve site; and the decision of Sweden, Norway and Finland to continue their joint expeditions to Antarctica to contain the costs of logistic support.

A-53587

Sovetskaia antarkticheskaia ekspeditsiia, Galkin, R.M., ed, **Thirtieth Soviet Antarctic Expedition. Winter studies of 1984-1985** [Tridtsataia Sovetskaia antarkticheskaia ekspeditsiia. Zimovochnye issledovaniia 1984/85 g.], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1992, Vol.88, 128p., In Russian. Refs. passim. For individual papers see 50-145 through 50-149 or F-53590, F-53591, F-53594, F-53595, H-53592, H-53593, I-53588 and I-53589.

This volume contains information on observations and results of scientific efforts carried out by the 30th Soviet Antarctic Expedition on the antarctic continent and surrounding waters from Jan. 1985 to Apr. 1986. Seasonal activities and organization of the expedition, including logistic support and contact with other expeditions, are outlined in the first part of the book. A chronological account of the events, beginning with the Expedition's departure from Vladivostok on Oct. 23, 1984 and ending on Apr. 1, 1985, is included in this section. The second part consists of 8 papers giving the scientific results of projects in hydrometeorology, glaciology, and medicine.

A-53611
Kristensen, M., **Days in Antarctica: about people and research—and a somewhat unusual expedition** [Dager i Antarktis: om folk og forskning—og en ekspedisjon litt utenom det vanlige], Oslo, Grøndahl Dreyer, 1993, 191p., In Norwegian.
DLC G850.A97K75

An account is given of an international expedition to Antarctica on board the *Aurora,* of the author's impressions and experiences, and of the scientific research projects in glaciology, meteorology and oceanography carried out through the 1991-1993 Aurora program.

A-53702
National Institute of Polar Research, **Report of the antarctic place-names of Japan: newly decided place names,** *Antarctic record,* Mar. 1995, 39(1), p.74-75, With Japanese summary.

This is a news item reporting that the Japanese Antarctic Place-names Committee has approved eight new place-names in the Ongul Is. area, Lützow-Holm Bay, on June 17, 1994. The names of the members of the Committee are listed; the new place names are not provided.

A-53748
Beck, P.J., **United Nations and Antarctica, 1994: the restoration of consensus?,** *Polar record,* Oct. 1995, 31(179), p.419-424, 16 refs.

The twelfth successive UN session on the 'Question of Antarctica, held at the close of 1994, saw a major change of direction. One brief session of the First Committee, followed by the General Assembly's adoption of resolution A49/80 without a vote, signified the restoration of a consensus approach towards the 'Question of Antarctica' for the first time since 1985. Resolution A49/80 stressed the need for Antarctic Treaty Parties (ATPs) to meet commitments undertaken at the 1992 United Nations Conference on Environment and Development, and particularly to continue providing the wider international community with information about antarctic developments. The 'Question of Antarctica' will not be placed on the UN agenda again until 1996, thereby breaking the sequence of annual UN discussions started in 1983. On the surface, consensus was restored, but it is debatable how far the outcome represented merely a papering over of the cracks rather than the basis for an enduring solution to the problems dividing ATPs and their critics. The key point at issue remains the nature and extent of the UN's future role in antarctic affairs, particularly as ATPs will only accept a limited UN role performed within the context of the Antarctic Treaty System. (Auth.)

A-53751
Scientific Committee on Antarctic Research, **SCAR bulletin No.119, October 1995,** *Polar record,* Oct. 1995, 31(179), p.443-462.

This bulletin contains the summary reports of the working groups to the 23rd meeting of SCAR, Rome, Italy, Sep. 4-9, 1994. These cover human biology and medicine, solar-terrestrial and astrophysical research, solid-Earth geophysics, geology, Cenozoic paleoenvironments of the southern high latitudes, the structure and evolution of the antarctic lithosphere, antarctic data management, and details of the COMNAP and SCALOP meetings.

A-53788
Korotkov, V.K., Frolov, IU.P., Efanov, S.F., **Krill distribution and fisheries in the South Orkney Islands region** [Rezul'taty issledovaniia raspredeleniia i oblova skopleniia krilia v lokal'nom raĭone IUzhnikh Orkneĭskikh ostrovov], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.176-179, In Russian.
DLC QH84.2.P45

Data on krill abundances and distribution around the South Orkney Is., obtained in Feb.-Mar. of 1988, are discussed and presented in tables. Recommendations for best results for krill fisheries, including trawl selectivity and vertical opening, mesh size, water depth and time of day are included.

A-53789
Mokievskiĭ, V.O., **Krill harvesting and man's role in the trophic chain** [Promysel krilia i rol' cheloveka v troficheskoĭ tsepi], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.179-180, In Russian. 8 refs.
DLC QH84.2.P45

Based on literature data, the possibility of krill utilization for human and livestock consumption is evaluated, with the conclusion that krill represents one of the most profitable marine industries.

A-53790
Kashkin, N.I., **Inevitable consequences of large-scale krill fishing in the Antarctic** [Neizbezhnye posledstviia shirokomasshtabnogo promysla antarkticheskogo krilia], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.180-181, In Russian. 2 refs.
DLC QH84.2.P45

With reference to the krill *Euphausia superba* it is argued that removal of large quantities from populations species occupying intermediate trophic levels will inevitably disturb the ecosystem homeostasis and will sooner or later result in the loss of the more valuable species at the top of the trophic pyramid. Another argument against large-scale krill fishery is that krill is fished with fine-meshed trawls and the catches always contain substantial quantities of pelagic juveniles of commercial fish species the stock of which have already been undermined. It is believed that the contemplated development of a large-scale krill fishery will lead to an ecological catastrophe in the Antarctic. An international ban should be imposed on the intermediate trophic links of oceanic biocoenoses and they should be removed from the category of biologic resources of the ocean.

A-53791
Menshutkin, V.V., **Simulation model of the antarctic krill population** [Imitatsionnaia model' populiatsii antarkticheskogo krilia], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.182-185, In Russian. 6 refs.
DLC QH84.2.P45

The objective of this study is to determine production characteristics of the antarctic krill population on the basis of available data on the size and weight distribution in samples obtained with a modified Isaacs-Kidd trawl. An approach to the determination of production characteristics is proposed whereby first a simulation model of the krill population is constructed, then the model is identified using direct observation data and then the P/B coefficient for the model population is estimated. The model is described and the P/B coefficients obtained with the use of data for different antarctic areas are discussed.

A-53792
Samyshev, E.Z., **Training research trawl of the Samyshev-Evdokimov design** [Uchetnyĭ nauchno-issledovatel'skiĭ tral konstruktsii Samysheva-Evdokimova (krilevyĭ tral S/E)], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993,

p.185-187, In Russian. 6 refs.

DLC QH84.2.P45

A series of tests carried out in the Indian Ocean sector of the Antarctic between Feb. 13 and Apr. 8, 1989 allows the author to recommend the use of S/E trawls for krill harvesting.

A-53793

Norinov, E.G., Efanov, S.F., **Trawl mesh form influence on its selective properties as exemplified by antarctic krill** [Vliianie formy iachei na selektivnye svoĭstva trala na primere antarkticheskogo krilia], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.187-190, In Russian. 4 refs.

DLC QH84.2.P45

Data on trawl selectivity for krill fishing, collected during 1981-1985 seasons from various ships and different sectors of the southern oceans, are analyzed. Results of tests carried out with square- and diamond-shaped netting are shown in a table.

A-53794

Akishin, V.V., **Survival of krill escaping from the trawl** [Vyzhivaemost' krilia, vyshedshego iz trala], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.190-195, In Russian.

DLC QH84.2.P45

This paper describes a study of krill escaping from different parts of the trawl net and experiments performed to estimate the survival of krill injured when passing through net meshes. The results suggest that the mortality from injuries suffered in the process of trawling is insignificant, not exceeding 5-10% of the krill entering the trawl mouth.

A-53795

Efanov, S.F., Bidenko, G.E., Boronin, V.A., **Effects of trawl fishing on icefish populations** [Vozdeĭstvie tralovogo promysla na oblavlivaemuiu chast' populiatsii ledianoĭ ryby], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.195-196, In Russian.

DLC QH84.2.P45

Experimental work is reported on the selectivity of trawl bags of different mesh sizes with regard to survival and preservation of young fish escaping from the trawl.

A-53808

Reed, M.R.W., **Antarctica's logistic support defined as a military operation other than war,** *Naval War College. Joint Military Operations Department. Final report,* Feb. 13, 1995, 20p., ADA-293 274, 12 refs.

The Department of Defense (primarily the Navy) provides to the National Science Foundation, Division of Polar Programs, the logistic support for scientific research in Antarctica. The support of antarctic research by the military is a long and valuable tradition, beginning with the enormous contributions of RADM Richard E. Byrd. This legacy continues with the weather, air traffic control, helicopter, aircraft, postal, radio, television, recreation, medical, dental, communications, disbursing and religious services provided by the military. The employment of these services meets the six principles of military operations other than war, namely the criteria of mission, objective, unity of effort, security, appropriate force, and legitimacy in order to meet a national strategy. (Auth. mod.)

A-53813

Stoker, C.R., **Telepresence in the human exploration of Mars: field studies in analog environments,** *U.S. National Aeronautics and Space Administration. Conference publication,* Dec. 1993, NASA-CP-10129, Symposium Vision-21: Interdisciplinary Science and Engineering in the Era of Cyberspace, Westlake, OH, Mar. 30-31, 1993. Proceedings, p.23-34, N94-27360, 4 refs.

As part of an effort to develop telepresence to support Mars exploration, NASA is developing telepresence technology and using it to perform exploration in space analog environments. This paper describes experiments to demonstrate telepresence control of an underwater remotely operated vehicle (TROV) to perform scientific field work in isolated and hostile environments. Toward this end, NASA developed a telepresence control system and interfaced it to an underwater remotely operated vehicle. This vehicle was used during 1992 to study aquatic ecosystems in Antarctica including a study of the physical and biological environment of a permanently ice-covered lake. NASA also performed a preliminary analysis of the potential for using the TROV to study the benthic ecology under the sea ice in McMurdo Sound. These expeditions are opening up new areas of research by using telepresence control of remote vehicles to explore isolated and extreme environments on Earth while also providing an impetus to develop technology which will play a major role in the human exploration of Mars. Antarctic field operations in particular provide an excellent analog experience for telepresence operation in space. (Auth. mod.)

A-53899

Amato, E., **Environmental impact assessment at sea,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.479-503, 9 refs.

Considering that the antarctic ecosystems and the delicate equilibrium that regulates them are threatened by human activities, a multidisciplinary project was initiated in 1986-1987 at Terra Nova Bay Station to assess their impact on the environment. Methods and materials used are described. Findings concerning xenobiothics and heavy metals in the coastal marine trophic net, and the benthic communities in the Bay, are discussed. A chronicle of the author's activities during the 1986-1988 expeditions to Terra Nova Bay, a list of the equipment used, and tabulated data are appended.

A-53941

Mervis, J., **Pressure on budget triggers review of antarctic program,** *Science,* Dec. 1, 1995, 270(5241), p.1433-1434.

A scheduled congressional review of the U.S. antarctic research program against a background of budget cutting may put the rejuvenation of Amundsen-Scott Station at risk. The Congress may also be looking at whether the U.S. should reduce its entire antarctic research effort or seek out ways to participate in joint programs with other countries.

A-54007

Sabourenkov, E., **Information on CCAMLR measures to prevent incidental mortality of seabirds,** *Marine ornithology,* 1994, 22(2), p.250-252.

Conservation Measure 29/XI, adopted by CCAMLR in 1992, implements several strategies for preventing incidental mortality of seabirds. The use of net monitor cables in trawl fishing in the CCAMLR Convention Area is prohibited from the 1994-95 season (Conservation Measure 30/X). Vessels trawling in the Convention Area are now using the suggested method of weighting monitor cables so that they do not snag flying birds, prior to the phasing out of monitor cables by the 1994-95 season.

A-54013

Reuterskioeld, M., **Swedish Antarctic Research Programme, 1989/90: a cruise report,** Stockholm, Swedish Polar Research Secretariat, 1992, 44p., PB95-222154, Refs. passim.

The cruise report from the Swedish Antarctic Research Programme (SWEDARP 89-90) covers the continuation of the field work carried out in 1988-89. The expedition's destination was the Nordenskioeld Base where the Finnish Aboa and the Swedish Wasa Stations were established in 1988-89. (Auth.)

A-54024

Centro Ricerca e Documentazione Polare, Rome, **Polar news/ Notizie polari, Vol.10, No.10,** 1995, p.53-58, In Italian and English.

The news items concerning Antarctica in this issue include investigations of wind as a source of power, carried out at various antarctic stations; the British Antarctic Survey's scaling down of its operations at Signy I.; installation of broadband digital seismometers at the South Pole and the Dry Valleys; and celebrations of the 40th anniversary of Operation Deepfreeze, held in New Zealand from Sep. 24 to Oct. 5.

A-54025
Centro Ricerca e Documentazione Polare, Rome, **Polar news/ Notizie polari, Vol.10, No.9,** 1995, p.46-52, In Italian and English.

The news items concerning Antarctica in this issue include a temperature record at Faraday Station showing a warming trend over 44 years of an average of 2.7°C; a description of the ozone lidar measurement method and of the processes involved in ozone depletion; and a silver five-dollar coin, issued by the Australian government to commemorate Sir Douglas Mawson's expeditions to Antarctica.

A-54026
Programa Antártico Brasileiro—Brazilian Antarctic Program (PROANTAR), [1988], var. p., Unpublished manuscript.

The first part of this manuscript gives a brief history of the Brazilian antarctic program, beginning with May 16, 1975, when Brazil acceded to the Antarctic Treaty as an observer, and ending with outlines of 5 Brazilian antarctic expeditions and 2 wintering-over parties, the last of which started a field program on Mar. 18, 1987 in meteorology, gravimetry, geomagnetism and upper atmosphere physics. The second part of the manuscript gives the preliminary results of the first Brazilian geological expedition in waters west of the Antarctic Peninsula, on board the *Almirante Camara* in Jan. 1987.

A-54027
Antarctic Society of Australia, **Newsletter, No.42, Sep. 1995,** Pymble, New South Wales, 1995, 20p.

The newsletter consists of two reports: the Antarctic and Southern Ocean Coalition report on the 19th Antarctic Treaty Consultative Meeting, held in Seoul, South Korea May 9-19, 1995; and the report on the 47th Annual Meeting of the International Whaling Commission, held in Dublin, Ireland, May 29-June 2, 1995.

A-54029
New Zealand. Ministry of Foreign Affairs and Trade. NZAP, **New Zealand Antarctic Programme. 1995/96 handbook,** Christchurch, 1995, 48p.

This handbook details the range of research and support events in the 1995-1996 season, in which NZAP will coordinate some 220 scientists, specialists and support staff involved in about 40 events. Most scientific activity will be conducted in and around Ross I., McMurdo Sound and the Dry Valleys. In addition, the handbook outlines important legal and procedural requirements for the participants' benefit. A list of principal investigators, research organizations and contact addresses is appended.

A-54030
New Zealand Antarctic Society, **Antarctic, Vol.13, No.11,** Christchurch, 1995, p.430-460.

Research activities and news items concerning New Zealand, Australia, Korea, Russia, United Kingdom and the United States cover the following: the 4th COMNAP meeting, held in Santiago July 31-Aug. 4; comprehensive agendas set for CCAMLR standing committee meetings; NZAP's 1995-1996 program; Australia's shipping schedule and projects for the 1995-1996 season; a record drilling depth of 3058 m, reached by Russian scientists at Vostok Station; the eighth Korean Antarctic Research Expedition, studying the coastal benthic ecology; new BAS facilities at Rothera Station; and the NSF plan to rebuild Amundsen-Scott Station at an estimated cost of 220 million dollars. Some general news includes a UK conservation program to begin at Port Lockroy this coming season.

A-54037
New Zealand. Ministry of Foreign Affairs and Trade. NZAP, **New Zealand Antarctic Programme. Report 1994/1995,** Christchurch, 1995, 36p.

In managing New Zealand's activities in the Antarctic over the 1994-95 fiscal year, the New Zealand Antarctic Programme (NZAP) has again supported a range of biological, atmospheric and geological research projects. This report outlines the 26 science events that have contributed to increasing understanding of the antarctic and global environments: from a record low for photosynthesis in the field to the tracking of another deep and intense ozone hole. Four appendices conclude this report: NZAP financial allocation 1994/95; Programme participants; Ross Dependency Research Committee members and organizations; and a publication list for 1994.

A-54038
New Zealand Antarctic Society, **Antarctic, Vol.13, No.5,** Christchurch, 1994, p.178-224.

Research activities and news items concerning New Zealand, Australia, France, Germany, United Kingdom and the United States cover the following: two ozone studies among the NZAP winter programs; a seismic traverse of Wilkes subglacial basin; Global Positioning System used for mapping in the Ross Dependency; activities at Scott Base and Vanda Station; ANARE's 40 years at Mawson Station; marine geophysics, studied on Amundsen and Bellingshausen seas; BAS marine science program curtailed by fire; the damage caused to the Dumont d'Urville airstrip, days before its opening; and a review of USAP's season projects. Some general news include a rescue operation of a Norwegian party of four, trapped near to the Shackleton Mountains; some statistics from the season's activities; a hut destroyed by fire on Enderby I.; and IWC meetings and decisions made.

B. BIOLOGICAL SCIENCES

B-51658

Arrigo, K.R., **Impact of ozone depletion on phytoplankton growth in the southern ocean: large-scale spatial and temporal variability,** *Marine ecology progress series,* Nov. 3, 1994, 114(1-2), p.1-12, 35 refs.

A numerical model has been used to assess the impact of decreased O_3 (ozone) concentrations over the southern ocean on phytoplankton production. The model includes components describing (1) atmospheric spectral radiation (280 to 700 nm) as a function of time and latitude, (2) in-water bio-optics, and (3) primary productivity, as determined by the depth-dependent spectral distribution of ambient irradiance and the action spectrum for photosynthesis. Model results show that in early spring, a 50% reduction in stratospheric O_3 enhanced the integrated production within the euphotic zone by about 9% at 75S and by 0.5% at 50S, due to the increased transmission of photosynthetically usable radiation, PUR (400 to 700 nm). Later, as solar zenith angles decreased, UV inhibition overcame PUR-induced enhancement, and integrated phytoplankton production was inhibited, but by less than 1.0%. A similar pattern resulted when observed O_3 concentrations were used as model input, although the PUR-induced enhancement effect was substantially reduced. UV inhibition at normal O_3 concentrations was most severe at the sea surface and dominated by UVA, reducing production by a maximum of 54%. Because sea ice extent is greatest when and where O_3 is at its minimum, and major phytoplankton blooms generally occur well after ozone concentrations have rebounded to normal levels, the potential impact of increased UVB transmission in the southern ocean is further reduced. It is concluded that increased transmission of UVB beneath the ozone hole would result in only a slight incremental increase in UV inhibition of depth-integrated phytoplankton production over that which occurs naturally. (Auth. mod.)

B-51659

Torres, J.J., et al, **Metabolism of antarctic micronektonic crustacea as a function of depth of occurrence and season,** *Marine ecology progress series,* Oct. 27, 1994, 113(3), p.207-219, 40 refs.

Oxygen consumption rates were determined on 21 species of crustaceans typical of the southern ocean micronektonic crustacean assemblage during spring, fall and winter. Specimens were collected in the Scotia-Weddell Sea region in the vicinity of 60S, 40W in the upper 1000 m of the water column. Respiration declined with depth of occurrence despite the isothermal character of the water column, suggesting that lower metabolic rates are a temperature-dependent adaptation to life in the deep sea. Three species of crustacea showed a lowered metabolism during the winter season: krill and the 2 hyperiid amphipods *Cyllopus lucasii* and *Vibilia stebbingi.* Critical oxygen partial pressure varied between 29 and 52 mm Hg, well below the lowest such levels found in the water column. It is suggested that the long nights of the antarctic winter decrease the effectiveness of visual predation in the epipelagic zone, allowing lowered metabolic rates to be a viable overwintering strategy for some species. (Auth. mod.)

B-51660

Torres, J.J., et al, **Proximate composition and overwintering strategies of antarctic micronektonic crustacea,** *Marine ecology progress series,* Oct. 27, 1994, 113(3), p.221-232, 32 refs.

Proximate (protein, lipid, carbohydrate and chitin) and elemental (carbon and nitrogen) composition were determined for 18 species of antarctic micronektonic crustacea, representing the majority of species found in the antarctic water column. Individuals used in the analyses were captured during fall and winter; for 8 species data were collected in both seasons. Seven of the 8 species showed some evidence that combustion of body stores was an aid to surviving the winter months; comparison with data from other investigators suggests that most of the species inhabiting shallow and mid-depths exhibit some degree of combustion of body stores during winter. Three types of overwintering strategies are proposed for antarctic zooplankton and micronekton. Type 1, exhibited by some calanoid copepods, is characterized by accumulation of large lipid deposits and a true dormancy, or diapause, during winter. Type 2, exhibited by euphausiids and hyperiid amphipods, is characterized by a marked reduction in metabolic rate, combustion of body substance, opportunistic feeding, but no true dormancy. Type 3 is exhibited by decapods and gammarid amphipods; it is characterized by an absence of a winter reduction in metabolic rate, combustion of body stores in some species but a lack of combustion or accumulation of energy in others, and opportunistic feeding. Overwintering scenarios computed for krill suggest that the impact of the winter season is most severe in the smaller size classes. (Auth. mod.)

B-51685

Bonner, W.N., **Environmental protection and science in the Antarctic,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.6-11.

DLC G845.5.A54 1994

The author examines the conflicts of interest between the environmentalist and science communities, noting that while it has a high priority in Antarctica, environmental protection is not the only or even the main concern. Antarctica has been shown to have considerable effect on many global natural processes and human activities. With over-restrictive environmental policies, the scientific research effort to discover the extent of the antarctic effect is likely to be curtailed to the detriment of the rest of the world. It is pointed out that damage to the environment by human presence is highly localized, extending to only a short radius around the bases and stations. In effect, most of the environmental damage has been in the form of eyesores rather than real or extensive destruction. Enforcement of overly-restrictive environmental policies has always been difficult or impossible to achieve, resting as it does on the consent of the governed. The ultimate aim in Antarctica must be to control human activities so as to preserve scientific, wilderness, and esthetic values for the use and enjoyment both by present and future generations of mankind, for they are the values that are integral to our whole environment.

B-51691

Marchant, H.J., **Biological impacts of seasonal ozone depletion,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.95-109, 79 refs.

DLC G845.5.A54 1994

The concentration of stratospheric ozone in springtime over the Antarctic has been decreasing since the mid-1970s. Also, there have also been occasions in the past when stratospheric ozone concentrations have declined as a result of "natural" perturbations to the stratosphere by volcanic eruptions and massive meteor impacts such as the Tunguska impact on Siberia in 1908. It has been reported that the likely loss of stratospheric ozone in the Northern Hemisphere resulting from the Tunguska impact was 30% which persisted for some years. Despite experimental evidence of antarctic organisms being under UV-B stress, and that there has been stratospheric ozone depletion occurring for at least the last decade, and evidence of past incidents when there has been ozone depletion, there is no clear evidence of unequivocal changes in the marine ecosystem. This is hardly surprising considering that UV exposure is just one of a suite of environmental stresses to which these organisms are exposed. While there is a pattern of annual species succession, there is also interannual variability in the timing and abundance of individual species, and it is not possible to ascribe this heterogeneity to a single stress. In addition, quantitative information on spatial and temporal antarctic phytoplankton and populations of other organisms before the development of the ozone hole is sparse, making comparisons with present-day assemblages difficult. (Auth.)

B-51692

Tréguer, P., **Southern ocean: biogeochemical cycles and climate changes,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.110-128, 53 refs.

DLC G845.5.A54 1994

A significant part of the CO_2 exchanges between atmosphere and ocean is determined by biogeochemical processes, the so-called biological pump. Modelling these CO_2 exchanges needs quantification of biogenic fluxes. Present knowledge of these processes and estimates of the fluxes are still very rudimentary. For example, it is not known why the exceptional nutrient richness of the southern ocean is not used. Because of this non-used richness, the southern ocean is a huge source of nutrients for the surface waters of the rest of the world ocean. Every year considerable amounts of nutrients are transported northwards, indirectly supporting the very large productivity of coastal upwellings in the Southern Hemisphere. Any modification in the yield of photosynthetic activity in the southern ocean indirectly entrained by climate change should have marked consequences for remote economically important marine ecosystems. To understand and to model the direct and/or indirect impact of climate change on biogeochemical processes and fluxes in the southern ocean is a major concern for the International Geosphere-Biosphere Program (IGBP). The current functioning of this biogeosystem is explained and related to changes experienced in the world and southern oceans in the past as a way to help understand expected future changes.

B-51694

Nicol, S., **Antarctic krill—changing perceptions of its role in the antarctic ecosystem,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.144-166, 75 refs.

DLC G845.5.A54 1994

Over the decade 1985-1994, the general perception of krill as being short-lived planktonic animals has changed to one which treats them as long-lived, socially organized creatures. The concept of regarding krill as passive indiscriminate filterers of Southern Hemisphere waters has given way to one which sees them active as feeders and significant contributors to the flux of organic matter and minerals from surface waters at high latitudes. Krill are now the focus of a large fishery rather than merely being the staple food of a range of exploited species. The products of the fishery are being developed for the luxury end of the market and are no longer seen as cheap protein for the Third World. Despite all these changes in the knowledge of the biology of krill, the perception of the central role that this organism plays in the antarctic ecosystem remains largely unchanged. The ecosystem is, if not krill-based, at least krill-centric, with this uniquely successful crustacean constituting the linchpin of the world's only circumglobal ecosystem. The scientific study of krill will continue for a number of reasons; partly because they are the prey of so many diverse predators, partly because they are a resource in their own right, but also because their huge abundance highlights an evolutionary success story which is yet to be told. It is hoped that the initiatives begun in 1991 will bear fruit and that the management of krill will be as successful as the species has been.

B-51699

Arntz, W.E., Gallardo, V.A., **Antarctic benthos: present position and future prospects,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.243-277, 182 refs., less all prior to 1980. Full list available from the authors on request.

DLC G845.5.A54 1994

For the present review, 280 papers related to benthic research were considered. Of these, 145 have been published since 1984 and were used in the analysis. All purely taxonomical works were excluded, that is, those without a connection to ecological questions. Major topics in these papers include: environmental conditions of the past; present physical factors influencing the benthos, the role of physical disturbance; evolution of the benthic fauna; distributional and zonational patterns (relevance of depth, substrate, and distance from the ice edge); densities, biomasses, productivity; species richness, diversity, equitability; dynamics of antarctic benthic communities (including recolonization/succession); biotic interactions/trophic dynamics; physiology/autecology; life history patterns and strategies; conservation aspects; methodologies; and future benthic research.

B-51701

Hubold, G., **Future of antarctic science—biosphere,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.283-287, 5 refs.

DLC G845.5.A54 1994

It is not within the scope of this short presentation to evaluate the different viewpoints regarding the development of Antarctica, i. e. exploitation or conservation, nor to cover both terrestrial and marine antarctic systems. The focus is rather on some biological features which are of basic importance for the understanding of antarctic marine biology. These may contribute to a rational development of future antarctic biological research as an input to the developing global environmental research under the International Geosphere Biosphere Program (IGBP).

B-51703

Arrigo, K.R., Sullivan, C.W., **High resolution bio-optical model of microalgal growth: tests using sea-ice algal community time-series data,** *Limnology and oceanography,* May 1994, 39(3), p.609-631, 61 refs.

A high resolution, two-dimensional time-dependent model of microalgal growth has been developed in which simulated physiological responses are determined by ambient temperature, spectral irradiance, nutrient concentration, and salinity. The model is based on the concept of a maximum temperature-dependent growth rate that is subsequently reduced by limitations imposed from insufficient light or nutrients, as well as sub- or supraoptimal salinity. Particular emphasis was placed on developing the formulation for light limitation, which includes the effects of diel changes in spectral irradiance, seasonal changes in photoperiod, and related adjustments in biochemical C:Chl *a* ratios. This level of detail was needed because the importance of light limitation has been demonstrated on diurnal, seasonal, and annual time scales in polar regions. The model was tested by comparing simulation results to a sea-ice microalgal bloom in McMurdo Sound in 1982. Environmental information from 1982 and biological coefficients derived from sea-ice communities were used as model input. Model results showed excellent agreement with microalgal bloom dynamics observed in 1982 under a variety of environmental conditions. Predicted Chl *a* standing crops were consistently within 15% of observations for the congelation ice and platelet ice, regardless of snow thickness; predicted vertical distributions of Chl *a* exhibited the same depth- dependent pattern as observations. (Auth. mod.)

B-51717

Voskoboinikova, O.S., Tereshchuk, O.IU., Kellermann, A., **Osteological development of the antarctic silverfish *Pleuragramma antarcticum* (Nototheniidae),** *Cybium,* Sep. 30, 1994, 18(3), p.251-271, With French summary. Refs. p.261-271.

This paper presents a study of the osteological development of the antarctic silverfish *Pleuragramma antarcticum* Boulenger (Nototheniidae). In comparison with other investigated nototheniids the development and ossification of the basioccipital and exoccipital were found to occur late in the neurocranium. The formation of the unusually large basioccipital condyle for the vertebral column and the lack of the exoccipital condyle at the level of the temporal edge of the cranium are considered as distinguishing features of this species. The appearance of the bones of the ethmoidal region and certain bones of the splanchnocranium is also delayed. The projecting upper part of the cleithrum is considered a diagnostic feature of *P. antarcticum.* Four free pectoral radials develop from the radial cartilage; the upper subsequently fuses with the scapula. In early stages there are three pectoral interradial foramina between the radials which close from top to bottom, except the lowest. The ossification of the axial skeleton has three centra: from urostyle posteriorly, from anterior part of notochord posteriorly, and may also occur at the level of the third to fourth posterior ray of the second dorsal fin. (Auth.)

B-51718

Vacchi, M., Greco, S., **Capture of the giant nototheniid fish *Dissostichus mawsoni* in Terra Nova Bay (Antarctica): notes on the fishing equipment and the specimens caught,** *Cybium,* June 30, 1994, 18(2), p.199-203, With French summary. 13 refs.

Ichthyological surveys were carried out in the frame of the PNRA (National Project for Scientific Research in Antarctica) activities during the 6th Italian expedition in the austral summer 1990-91. To catch *Dissostichus mawsoni,* the presence of which was suspected but not recorded, special gear was used in an area of the Terra Nova Bay Station. Because of the presence of drifting ice, the fishing gear had to be either rapidly set in place or alternatively hauled aboard, in order to minimize the probability of accidental dragging. The technique used in the capture of the toothfish *D. mawsoni* is described. (Auth.)

B-51720

Franklin, C.E., Crockford, T., Johnston, I.A., Kamunde, C., **Thermostability of haemoglobins from the hot-spring fish *Oreochromis alcalicus grahami*: comparisons with antarctic and temperate species,** *Journal of thermal biology,* Aug. 1994, 19(4), p.277-280, 13 refs.

The thermostability of haemoglobin was measured in three species of fish living at different environmental temperatures (ET). The time (min.) for 50% denaturation (T1/2d) of the haemoglobin at 2 mg/ml in 50 mM phosphate buffer, pH 7.3 was 46.4 for *Oreochromis alcalicus grahami* (ET, 35 to 42 C), 43.1 for *Oreochromis niloticus* (ET, 18 to 26 C) and 19.2 for the antarctic teleost, *Notothenia coriiceps* (ET, -1.5 to 1 C) (Mean +/- SEM, N=5-7 preparations). In contrast, T1/2d for haemoglobin from birds and mammals is usually in excess of 500 min. These results suggest that the lower thermostability of haemoglobins in fish relative to birds and mammals is not solely a function of differences in body temperature. (Auth.)

B-51733

Zhu, G.H., Wang, Z.P., **Study of nano- and microalgae in adjacent waters of Antarctica. IV. Distributions of nano- and microdiatoms in the intertidal zones of Zhongshan Station,** *Antarctic research (Chinese edition),* June 1994, 6(2), p.46-52, In Chinese with English summary. 6 refs.

The composition and distribution of nano- and microdiatoms in the intertidal zones of the Zhongshan Station, Larsemann Hills are discussed. The samples were collected from seven sand-grit flat stations in Jan. 1989 and Feb. 1990. The maximum cell abundance of nano- and microdiatoms occurred at Station B: 0.8×10^3 to 3651×10^3 and 4.5×10^3 to 2618×10^3 cells per g sand in Jan. 1989 and Feb. 1990, respectively. The distributional characteristics of nano- and microdiatoms in the intertidal zones included small cell size and high cell abundance. The dominant species was *Navicula glacieri.* (Auth. mod.)

B-51736

Martinez Macchiavello, J.C., Salas Aramburu, W., **Taxonomic and ecological catalog of diatoms from Argentina and the antarctic insular lakes** [Catálogo Taxonómico-ecológico de las diatomeas no-marinas recientes y fósiles de la Republica Argentina], *Buenos Aires. Instituto Antártico Argentino. Publicación,* 1994, No.27, 113p., In Spanish. Refs. p.111-112.

This guide to the taxonomy and ecology of recent as well as fossil terrestrial diatoms lists a total of 1274 taxa collected in Argentina and the antarctic insular lakes. The species are grouped by the authors who take into consideration the different physical and chemical parameters of each species. Instructions to the access codes used are provided.

B-51751

Song, W.B., Wilbert, N., Hill, B.F., **Description of three endocommensal ciliates from sea urchins in the Weddell Sea, Antarctica (Protozoa, Ciliophora),** *Antarctic research (Chinese edition),* Sep. 1994, 6(3), p.53-61, In Chinese with English summary. 15 refs.

The morphology and infraciliature of 3 endocommensal ciliates, *Strombidium echini* Song, *Parauronemoides echini* Song and *Paracryptochilidium antarcticum* Song from the digestion tract of sea urchins in the Weddell Sea was investigated during Apr., 1992. The *P. echini* is characterized by a bilateral flattened body shape, absence of the naked apical plate, shortened somatic kinetics direct to the ventral surface and a twisted narrow buccal field. *P. antarcticum* can be distinguished by the D-shaped body, a buccal apparatus which is located at the posterior 1/4 of cell length, the pedal-like "branched" macronucleus and the absence of a caudal projection. Different from many other congeners, the dorso- ventrally flattened *S. echini* consists of one girdle and two postequatorial kinetics. (Auth. mod.)

B-51766

Scott, P., McMinn, A., Hosie, G., **Physical parameters influencing diatom community structure in eastern antarctic sea ice,** *Polar biology,* Nov. 1994, 14(8), p.507-517, Refs. p.516-517.

Diatom assemblages obtained from fast ice around Prydz Bay are distinctly different from those obtained from pack ice in the same area. The dominant species in all ice cores were *Fragilariopsis curta, F. cylindrus, Nitzschia stellata* and *Pseudonitzschia turgiduloides. Entomoneis kjellmanii* and *Cocconeis* spp. were more characteristic of fast ice samples and *F. curta* of pack ice samples. Ice crystal type (i.e. whether frazil or congelation crystal) is an important factor in determining the algal composition of the ice. Other significant influences include the time of year, the ice form and the salinity of the ice. (Auth.)

B-51767

Palm, H., Andersen, K., Klöser, H., Plötz, J., **Occurrence of *Pseudoterranova decipiens* (Nematoda) in fish from the southeastern Weddell Sea (Antarctic),** *Polar biology,* Nov. 1994, 14(8), p.539-544, 34 refs.

Eleven fish species from the Weddell Sea were examined for infestation with anisakid nematodes. Two species of the genus *Contracaecum* and the sealworm *Pseudoterranova decipiens* were isolated from the liver and the body cavity of fish affected. Only two specimens of *P. decipiens* (1.4%) partly invaded the belly flaps. The following fish species were infested by *P. decipiens* at the given prevalences: *Cygnodraco mawsoni* (74.4%), *Trematomus scotti* (23.2%), *Pagetopsis maculatus* (10.0%), *Cryodraco antarcticus* (7.1%), *Trematomus lepidorhinus* (3.0%), and *Dolloidraco longedorsalis* (2.7%). The reasons for low prevalence and intensity of infestation are seen in the difficulties of *P. decipiens* in completing its benthic life cycle in the Weddell environment, in the absence of shallow coastal waters due to the floating shelf-ice. *Cygnodraco mawsoni* is a crucial intermediate host, without which completion of the parasite life cycle might not be possible. In order to clarify the taxonomical position of antarctic *Pseudoterranova,* morphological comparisons with specimens of *P. decipiens* from the German and Norwegian coasts were made. Results revealed that not all specimens studied belong to the species *P. decipiens.* (Auth. mod.)

B-51768

Gibson, J.A.E., et al, **Volatile fatty and dissolved free amino acids in Organic Lake, Vestfold Hills, East Antarctica,** *Polar biology,* Nov. 1994, 14(8), p.545-550, 17 refs.

The distributions of volatile fatty acids (C1-C5) (VFAs) and dissolved free amino acids (DFAAs) in Organic Lake, a shallow hypersaline meromictic lake in the Vestfold Hills, were determined during the winter and spring of 1987. The concentrations of the two VFAs detected, formic and acetic acid, were low (<10 micromol) in the oxic upper waters of the lake, but increased dramatically (up to 250 micromol) beneath the oxycline. The distribution of DFAAs was similar, with a total concentration of 280 micromol in the anoxic water early in the study. The amino acids occurring at the highest concentrations were alanine, glutamic acid, leucine and valine. Total VFA concentrations in the anoxic zone increased during the study period, but the total amino acid concentration dropped significantly to 64 micromol by the end of the study. The high concentrations beneath the oxycline were probably the result of bacterial utilization of these substrates which was slow due to the high salinity and low temperature of the lake water. (Auth.)

B-51769

Atkinson, A., **Diets and feeding selectivity among the epipelagic copepod community near South Georgia in summer,** *Polar biology,* Nov. 1994, 14(8), p.551-560, Refs. p.559-560.

During the summers of 1989-1991, 7 copepod grazing experiments were undertaken near South Georgia. The copepods spanned 3 orders of magnitude in body mass, from young copepodids of small pesudocalanids to adult females of *Rhincalanus gigas.* Incubations were in natural seawater and feeding rates were determined by microscope counts of food items (size range 7-1200 microns). Daily rations of the smallest copepods were up to 120% body carbon per day. These high rations contrast with values of less than 10% for large copepods (older copepodids of *Calanoides acutus* and *R. gigas).* All sizes of copepods could ingest the full size spectrum of measured particles. However, maximum filtration rates of small copepods were on cells <100 microns whereas the large grazers cleared the largest cells (usually long diatoms) at maximum rates. Motile, non-diatom taxa <50 microns cells were of a suitable size for ingestion by small copepods and consequently occur more prominently in their diets. The ability of small copepods to feed heavily on cells <50 microns, before, during or after blooms, may be important in their life cycles, leading to reduced competition with their larger relatives. (Auth. mod.)

B-51770

Bozal, N., Manresa, A., Castellvi, J., Guinea, J., **New bacterial strain of Antarctica, *Alteromonas* sp. that produces a heteropolymer slime,** *Polar biology,* Nov. 1994, 14(8), p.561-567, 28 refs.

A bacterial strain NF_3 was isolated from a sludge sample from Admiralty Sound and has been identified as belonging to the genus *Alteromonas.* The isolate was a Gram-negative rod with a single polar flagellum arrangement. The strain was catalase and oxidase positive and capable of gelatin hydrolysis. The G+C content was 42 mol%. The fatty acid composition and the protein profile have confirmed its identification as *Alteromonas* sp. During cell growth, the strain produced an exopolymer composed of 76-86% protein and 8-14% sugars, depending on the medium used. (Auth.)

B-51775

Boussès, P., Réale, D., Chapuis, J.L., **Heavy winter mortality among the Corsican mouflons *(Ovis musimon)* of the Kerguelen Is.** [Mortalité hivernale massive dans la population de mouflons de Corse *(Ovis musimon)* de l'archipel subantarctique de Kerguelen], *Mammalia,* 1994, 58(2), p.211-223, In French with English summary. Refs. p.221-223.

The population of Corsican mouflon *(Ovis musimon)* introduced onto the Kerguelen archipelago shows periodic winter die-offs at most every five years. This paper investigates the mortality occurring in 1988, when at least 289 individuals died. Over 60% of the carcasses were recovered from caves located at the bottom of cliffs. These shelters are regularly used by the mouflons, allowing them to reduce their energetic expenditure in such a harsh subantarctic climate. A high proportion of lambs died during the winter crash. Among yearlings and adults, males showed a much higher level of mortality than females. Such sex-biased mortality is of prime importance for the dynamics of the population. After the crash, the population structure became strongly biased, with a sex ratio of 10 females to each male. (Auth.)

B-51776

Drewry, D.J., Shears, J.R., **Oil and gas exploitation in the polar regions: environmental perspectives,** *Journal of the World Energy Council,* July 1993, p.50-58, 47 refs.

DLC TJ163.15.W659a July 1993

In the past, the development of oil and gas fields in the polar regions has been limited mainly by severe climatic conditions and the lack of technology. These have mainly been overcome, and in the Arctic continued exploration remains a high priority. In retrospect, 1989 may be considered a turning point. The major oil spills that occurred in the polar regions that year, the *Exxon Valdez* in Alaska and the *Bahia Paraiso* in Antarctica, damaged the credibility of the oil industry in its claim that development was possible without significantly affecting the environment. The concern over the possible environmental effects of mining in Antarctica led to a ban on all mining activity for at least 50 years. Now and in the future it seems the oil and gas industry will be controlled primarily on the basis of its likely environmental impact. (Auth.)

B-51778

Vestal, J.R., **Cryptoendolithic communities from hot and cold deserts: speculation on microbial colonization and succession,** Primary succession on land. Edited by J. Miles and D.W.H. Walton, Oxford, Blackwell Scientific Publications, 1993, p.5-16, 41 refs.

DLC QH540.P74 1993

The cryptoendolithic microbial community is a complete ecosystem containing primary producers and consumer/decomposers located within the pores of certain types of rocks. It has no predators. This unique habitat provides enough protection for microbes to survive a physical environment characterized by extreme temperatures, aridity, low light and limited space. As conditions for metabolic activity are so limited in both frequency and duration, determining colonization and succession events in this environment is very difficult. Two types of antarctic community are recognized: one dominated by lichens and the other by cyanobacteria. The distribution of the communities appears to be related to water availability, the presence of iron oxide and rock strength. It is postulated that within these endolithic communities succession may only occur in the decomposer microbiota, and that the plant community constitutes a climax at establishment. (Auth.)

B-51779

Wynn-Williams, D.D., **Microbial processes and initial stabilization of fellfield soil,** Primary succession on land. Edited by J. Miles and D.W.H. Walton, Oxford, Blackwell Scientific Publications, 1993, p.17-32, 69 refs.

DLC QH540.P74 1993

Fellfield substrata are usually flexible or mobile and normally contain free water except in very cold deserts. Disruption by freezing and thawing with its resultant hydrostatic pressures causes particulate sorting and patterning of the ground. Abiotic weathering and exfoliation of rock initiate fellfield soil formation, while endo- and chasmolithic microbial communities accelerate these processes and provide an inoculum as a precursor to stabilization. Although not visually apparent, microbes may be the first colonists of all virgin substrata and may initiate or escalate plant succession. Phototrophic microbial crusts stabilize the fellfield soil surface by binding mineral particles in a cyanobacterial and algal filament-mucigel matrix. Epifluorescence microscopy and TV image analysis of undisturbed, moist frost- polygon fines at Signy I. suggested that scarce microbial resources may be conserved by the soil crust which is composed of a separable mosaic of heterogeneous microbial 'rafts'. A cloche enhanced the ambient conditions for microbial growth, resulting in an increase in surface area of microbial colonization of soil from 5 to 74% in three successive growing seasons. The relatively rapid growth rate of fellfield cyanobacteria and their sensitivity to environmental factors makes them valuable indicators of the short- and long-term effects of climatic change. (Auth.)

B-51780

Smith, R.I.L., **Role of bryophyte propagule banks in primary succession: case-study of an antarctic fellfield,** Primary succession on land. Edited by J. Miles and D.W.H. Walton, Oxford, Blackwell Scientific Publications, 1993, p.55-78, 77 refs.

DLC QH540.P74 1993

The role of bryophytes in primary succession is highlighted and their general omission from most studies of the early stage of colonization is emphasized. Bryophyte colonists develop from sexual and asexual propagules deposited over a long period from both local and distant provenances. Some may rapidly establish new plants, while others remain dormant indefinitely on or beneath the surface of the substratum. The viable component of these diaspores, the soil propagule bank, constitutes a reservoir of potential colonists equivalent to the seed bank of higher plants. An environmental stimulus or suite of stimuli may activate the dormant viable propagules into developing as new plants. Before this, microbial modification of the soil surface is usually required to bind and stabilize soil particles and provide a nutrient base. Laboratory and field experiments on maritime antarctic soils are used to illustrate aspects of the bryophyte propagule bank. The importance of ice fields as a sink for spores and vegetative propagules is stressed. Their release in meltwater onto terrestrial habitats near the ice margins is of particular importance in the colonization of newly exposed substrata. The possible effects of global warming, especially in polar regions, on these propagule banks, on the rate of colonization and on the species composition of the developing communities are considered. (Auth.)

B-51812

Williams, A.J., **Factors affecting time of breeding of gentoo penguins *Pygoscelis papua* at Marion Island,** Symposium on Birds of the Sea and Shore. Proceedings, 1979. Edited by J. Cooper, Capetown, African Seabird Group, 1981, p.451-459, 28 refs.

Gentoo penguins commence laying in mid-winter at their two northernmost breeding localities. Such timing of breeding is unique among southern ocean seabirds. There are no physical constraints (e.g. ice) limiting breeding at these localities. Food for newly independent chicks, egg formation and for the annual moult fast (the usual factors controlling the time of breeding in penguins) do not appear decisive in influencing the time of breeding in northern gentoo penguins. *Pygoscelis* penguins have a predominantly krill diet when breeding. At Marion I. there is apparently a marked change in the diet of gentoo penguins from predominantly krill in winter to predominantly fish in summer, probably as a result of competition for inshore krill stocks with *Eudyptes* penguins. It is suggested that gentoo penguins at northern breeding localities breed in mid-winter to ensure that their chicks receive a krill diet during the first few weeks of life. (Auth.)

B-51813

Olech, M., ***Japewia tornoensis*** **(lichenes), a species new to Antarctica,** *Polish botanical studies,* 1991, Vol.2, p.217-218, 9 refs.

Japewia tornoensis (Nyl.) Tønsberg, a species hitherto unrecorded from the antarctic botanical zone, is reported from King George I. and Livingston I., South Shetland Is. A description of antarctic material together with brief notes on its ecology, taxonomy and distribution are provided. (Auth.)

B-51814

Van Heezik, Y.M., Seddon, P.J., **Stomach sampling in the yellow-eyed penguin: erosion of otoliths and squid beaks,** *Journal of field ornithology,* Autumn 1989, 60(4), p.451-458, With Spanish summary. 24 refs.

Experimental feeding of Yellow-eyed penguins with meals containing cephalopod beak pairs and otoliths of known weight, and subsequent flushing of stomachs at 2-48 h intervals after feeding, were carried out to determine the rate of digestion of beaks and otoliths. Otoliths and beaks were placed in HCl to observe changes. All otoliths were totally digested after 24 h in penguin stomachs; disappearance rate was inversely related to size of the otolith. After 24 h squid beaks showed increasing signs of wear, the extent of which was dependent on the presence or absence of small stones in the stomach. Experiments showed that HCl only causes otolith erosion at pH 1.5; erosion rate was twice as slow as in the stomachs. Acid had no effect on squid beaks after 78 h immersion. (Auth.)

B-51817

Hatfield, E.M.C., Rodhouse, P.G., Porebski, J., **Demography and distribution of the Patagonian squid *(Loligo gahi* d'Orbigny) during the austral winter,** *Journal du conseil international pour l'exploration de la mer,* 1990, Vol.46, p.306-312, 19 refs.

DLC GC1.I64

A bottom-trawl survey of the Falklands Interim Conservation Zone was carried out during July and Aug. 1988. Samples of *Loligo gahi* were collected from depths of 50-400 m and analyzed for size composition, maturity, and stomach fullness. *L. gahi* increased in size and maturity with depths >100 m. Immature and fully mature squid were found at depths down to 100 m. The data support the hypothesis that this species spawns in shallow water and migrates down the continental shelf and continental slope after hatching. It then returns to shallow water to spawn. Highest concentrations of squid appeared to occur at depths and in areas where the commercial fishery operates. Samples were only taken during daylight hours, and stomach fullness was at its highest in the mid-afternoon. Several of the life history features resemble closely those of other loliginid species. (Auth.)

B-51818

Ryan, P.G., **Origin and fate of artefacts stranded on islands in the African Sector of the southern ocean,** *Environmental conservation,* Winter 1987, 14(4), p.341-346, 26 refs.

The ever-increasing amount of marine debris in the southern ocean gives cause for concern, but the subject is little studied. During 1984 the author surveyed the beaches for stranded artefacts on Tristan da Cunha, Inaccessible, Gough, and the Prince Edward Is. The types of debris, their origin, and probable fate, were recorded and are reported in this paper. More than 70% of the artefacts found were plastic. The density of artefacts was greater on the Tristan I. group than on the Prince Edward Is.—apparently owing to different frequencies of artefacts at sea, and the presence of a local fishery based on the Tristan group. Debris was most abundant on beaches exposed to prevailing westerly winds, and near human settlements. This pattern reflects the two chief sources of pollution: oceanic and local. Some plastic objects had apparently drifted at least 3,000 km from adjacent continental waters. Decay rate appeared to vary greatly between different types of debris, while some items were removed from beaches near settlements by local inhabitants for their own use. At present levels, stranded debris apparently has little impact on island faunas and floras and is less hazardous than debris at sea. However, active steps to curtail dumping by national bases and their supply vessels in the southern ocean are warranted, to maintain the aesthetic appeal of these remote islands. (Auth. mod.)

B-51830

Kennedy, A.D., **Simulated climate change: a field manipulation study of polar microarthropod community response to global warming,** *Ecography,* June 1994, 17(2), p.131-140, 49 refs.

Passive cloches were deployed at three altitudinally distinct sites on Signy I. to investigate the effect of ameliorated thermal environment upon fellfield microarthropod communities. Temperature was monitored at 1.5 m height, at ground surface level, and at 5 cm depth in cloche and control plots. During summer (Dec.-Mar.), cloches elevated monthly mean temperatures by up to 2.46 C at the soil surface and 2.20 C at 5 cm depth. Integrated air temperatures over consecutive 10 d periods were up to 4.65 C warmer in cloches than controls. After eight years of these manipulations, sampling of the upper 50 mm of soil revealed consistently greater microarthropod populations within cloches than in controls. Maximum difference occurred at high altitude where thermal amelioration was greatest. Cloche populations of the numerically dominant collembolan *Cryptopygus antarcticus* Willem contained an increased proportion of small individuals. No species new to Signy I. were recorded. (Auth. mod.)

B-51833

Du Plessis, C.J., Van Heezik, Y.M., Seddon, P.J., **Timing of King penguin breeding at Marion Island,** *Emu,* Sep. 1994, 94(pt.3), p.216-219, 13 refs.

King penguins breed in a circumpolar distribution, with 31% of the world population occurring at Marion I. in the Prince Edward Is. group. The breeding cycle of the King penguin is unique among penguins in taking more than one year to complete. Because the timing of breeding of individual penguins is influenced by the outcome of their previous breeding attempt, there is a considerable spread in the dates over which egg laying occurs. Chicks are subject to a winter period when they receive little or no food, and since late-hatched smaller chicks are less likely to survive this period, timing of breeding events will affect chick survival and ultimately population growth. Of the three localities that have been examined previously, Heard I. and Possession I. in the southern Indian Ocean have egg laying periods extending over three months, from late-Nov. to mid-Feb. However, at most southerly situated South Georgia, in the south Atlantic, egg laying was observed over four and a half months. This paper documents the timing of reproductive events at Marion I., a previously unstudied locality. (Auth. mod.)

B-51861

Culik, B.M., **Energy requirements of Pygoscelid penguins: a synopsis** [Der Energiebedarf der Pygoscelis-Pinguine: eine Synopse], *Berichte zur Polarforschung,* 1994, No.150, 76p., With German summary. Refs. p.69-76.

A synopsis of the energy and food requirements of Adélie *(Pygoscelis adeliae),* Chinstrap *(P. antarctica)* and Gentoo *(P. papua)* penguins during the breeding season is presented. Data on microclimate, bird activity on land, the usage of fat reserves, and data on the energetic costs associated with swimming and resting in cold water are used. Key parameters in the model for Pygoscelid penguin energetics were duration and energy expenditure during resting and walking (adults and chicks) and during swimming and resting at sea (adults), as well as fat loss in adults and energy requirements of the growing chicks. Adélie penguins require, for themselves and their brood, a total of 174 kg per breeding pair during the breeding season. With similar values for key parameters in the model, food requirements of Chinstrap and Gentoo penguins were 160 and 286 kg of krill per breeding season. The effects of instrumentation and human interference on the activity budgets, energy requirements and well-being of Pygoscelid penguins were also investigated. (Auth. mod.)

B-51862

Olech, M., **Lichens from the Admiralty Bay region, King George Island (South Shetland Islands, Antarctica),** *Acta Societatis Botanicorum Poloniae,* 1989, 58(3), p.493-512, With Polish summary. 27 refs.

Sixty-one lichen species new to the Admiralty Bay region are reported. Among them 51 are new to King George I., 35 to the South Shetland archipelago, 15 to the antarctic zone, and 6 to the Southern Hemisphere. A further 49 species were found at new localities. (Auth.)

B-51961

Olech, M., **Preliminary botanical studies in Johnsons Dock area (Livingston, Antarctica),** *Bulletin of the Polish Academy of Sciences. Biological sciences,* 1989, 37(7/9), p.223-230, With Russian summary. 5 refs.

The preliminary results of botanical investigations carried out in the region of Johnsons Dock before the establishment of a new antarctic station are presented. The provisional list of terrestrial plants contains 125 species including 105 species of lichens. (Auth.)

B-51973

Van Franeker, J.A., **Comparison of methods for counting seabirds at sea in the southern ocean,** *Journal of field ornithology,* 1994, 65(1), p.96-108, With Spanish summary. Refs. p.106-108.

Two methods for counting seabirds from ships were compared during a research cruise in the marginal ice zone of the northwestern Weddell Sea. The basic difference between the two methods concerns the way in which birds in flight are recorded. Methods using continuous counts of all birds crossing the transect area in flight result in bias in density estimates because they measure flux rather than density. To avoid bias due to bird movement, the Scottish Seabirds at Sea Team (SAST) recommended the snapshot method which uses instantaneous counts of birds in flight at specific time intervals to cover consecutive subsectors of the census area. Comparative investigations during EPOS showed that continuous counts resulted in bird density estimates about twice as high as densities derived from snapshot counts. The level of bias caused by continuous counts fluctuated widely between and within species. Effects of different variables such as species-specific behavior, ship speed, and wind force are difficult to separate. Instantaneous counts of birds in flight is strongly recommended because they yield better estimates of both relative and absolute densities of seabirds at sea. (Auth.)

B-51974

Weimerskirch, H., et al, **Alternate long and short foraging trips in pelagic seabird parents,** *Animal behavior,* 1994, 47(2), p.472-476, 19 refs.

The authors studied the provisioning patterns of 12 individual common diving petrels, *Pelecanoides urinatrix* (average weight when rearing chick: 145 g); 20 blue petrels, *Halobaena caerulea* (170 g); 22 thin-billed prions, *Pachyptilla belcheri* (131 g); 21 yellowed-nosed albatrosses, *Diomedea chlororhynchos* (2132 g); 25 black-browed albatrosses, *D. melanophris* (3750 g) and 37 wandering albatrosses, *D. exulans* (9266 g) on the Crozet, Kerguelen and Amsterdam islands. The birds were observed for periods of 20-30 days throughout hours of darkness for the nocturnal petrels, and throughout the daytime for albatrosses during the austral winters of 1990, 1991 and 1992 (wandering albatrosses), summers 1988-1989 (blue petrels) and 1991-1992 (four other species). (Auth. mod.)

B-51975

Vayda, M.E., Yuan, M.L., **Heat shock response of an antarctic alga is evident at 5°C,** *Plant molecular biology,* 1994, 24(1), p.229-233, 22 refs.

A subtidal seaweed collected in antarctic waters, *Plocamium cartilagineum* (L. Dix.) displayed induction of mRNAs encoding the 70 kDa heat shock protein (HSP70) and the ubiquitin polyprotein (UBI) when incubated at 5°C. Maximal induction of HSP70 mRNA was observed when the alga was incubated at 10°C for 1 h. Incubations at higher temperatures or for longer periods reduced the amount of HSP70 mRNA detected. Incubations at 20°C or greater resulted in cell death. These data indicate that despite the unusually low temperature of induction, this macrophyte exhibits a heat-shock response similar to that of other organisms at temperatures 5 to 10°C above usual growth conditions. (Auth.)

B-51976

Robertson, G., Kent, S., Seddon, J., **Effects of the water-offloading technique on Adélie penguins,** *Journal of field ornithology,* 1994, 65(3), p.376-380, With Spanish summary. 7 refs.

Experiments were conducted on Adélie penguins to examine the effect of the water-offloading technique to collect stomach samples on adult foraging cycle duration and mass gain in chicks deprived of a meal. No difference in foraging cycle duration between control and treated adults was found. Deprivation of a single meal had no effect on mass gain to fledging of 2-wk old chicks in two colonies, nor did it affect their growth. Survival rate of chicks of stomach-flushed adults and of those fed normally was similar for both colonies. The findings support the acceptance of the water-offloading technique as the most humane method of procuring stomach samples from Adélie penguins. (Auth.)

B-51981

Chapelle, G., Peck, L.S., Clarke, A., **Effects of feeding and starvation on the metabolic rate of the necrophagous antarctic amphipod *Waldeckia obesa* (Chevreux, 1905),** *Journal of experimental marine biology and ecology,* Oct. 27, 1994, 183(1), p.63-76, Refs. p.74-76.

One hundred individuals of the scavenging lysianassoid amphipod *Waldeckia obesa* (Chevreus, 1905) were collected from Antarctica and then maintained in cold-water aquaria at the British Antarctic Survey in Cambridge. One group were fed and then starved for 64 days, during which time oxygen consumption fell to 60% of the initial value, and ammonia excretion to 20%. The initial decrease in metabolism occurred in about 5 days, after which time ammonia excretion remained roughly constant whereas oxygen consumption (and hence O:N atomic ratio) oscillated. O:N ratio and proximate composition estimated stoichiometrically from elemental composition both indicated the use of protein and lipid as metabolic substrates during starvation. Fed amphipods exhibited a classic post-prandial increase in metabolism (specific dynamic action, SDA): oxygen consumption and ammonia excretion increased rapidly to a level between 4 and 7.5 times the prefeeding levels, respectively. (Auth.)

B-51982

Convey, P., **Influence of temperature on individual growth rates of the antarctic mite *Alaskozetes antarticus*,** *Acta oecologica,* 1994, 15(1), p.43-53, 27 refs.

A laboratory study was carried out to measure potential maximum growth rates and optimal temperatures for growth and survival of the antarctic oribatid mite *Alaskozetes antarcticus*. Using individual culture chambers, growth (fresh weight increment) and survival were monitored in two juvenile instars and adults at three culture temperatures (2, 7, 12°C) over a 10 month period. Approximately 50% of individuals survived for the duration of the study, with best survival being at 2°C and poorest at 12°C. Mean and maximum growth rates were most rapid at 7°C, and moulting occurred predominantly in the 7 and 12°C cultures. Intermoult intervals suggested that individuals may achieve a single moult each year in the field, at microhabitat mean temperatures approaching 7°C. It is concluded that at low (2°C) temperatures survival is maximized, but at higher temperatures there is a trade-off between increased growth rate and moulting frequency, and increasing mortality with lower weight at moulting. The relationship between temperature and growth found in the laboratory suggests that in the field *Alaskozetes* may take full advantage of the abundant food sources available in summer, in order to achieve maximum growth rates and moult once each season. (Auth. mod.)

B-51992

Loeb, V., Siegel, V., **Status of the krill stock around Elephant Island in 1991/92 and 1992/93,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.7-33, With French, Russian and Spanish summaries. 14 refs.

Krill stock composition and distribution patterns in the vicinity of Elephant I. during the austral summers of 1991-92 and 1992-93 are described and compared with information from previous years. The general distribution of krill length and maturity classes conformed to previous descriptions, and appears to be a recurring and predictable aspect of the krill stocks in the Antarctic Peninsula region. The length-frequency distributions and maturity stage composition reflected relatively good year class success from the 1990-91 spawning season but poor success in 1991-92. Year class success from these and other years appears to be associated with female maturity development and spawning during the early summer months. The overall abundance, maturity stage composition and reproductive activity of krill appeared to be affected by dense salp concentrations during 1992-93 and 1989-90. (Auth.)

B-51993

Trathan, P.N., Everson, I., **Status of the FIBEX acoustic data from the West Atlantic,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.35-48, With French, Russian and Spanish summaries. 17 refs.

Data from the FIBEX acoustic survey in the West Atlantic sector have been re-examined to check the consistency of krill abundance estimates derived from different survey vessels. There is a good level of consistency among the results from four of the vessels, *Itzumi, Dr Eduardo L. Holmberg, Odissey* and *Walther Herwig.* While there is an error factor due to the combination of data collected at 50 kHz *(Walther Herwig* survey) with data collected at 120 kHz (all other vessels), the authors conclude that this does not materially affect the estimated biomass. The data from the *Professor Siedlecki* survey provide estimates that are not consistent with the other surveys. The authors offer no explanation for this difference. (Auth.)

B-51994

De la Mare, W.K., **Modelling krill recruitment,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.49-54, With French, Russian and Spanish summaries. 2 refs.

A method is developed for using observed values of the mean proportion of recruits and its variance to model recruitment in an antarctic krill population in terms of numbers of recruits. The method includes the calculation of natural mortality and other parameters consistent with the observed proportional recruitment parameters. A procedure is given for generating families of recruitment functions which are consistent with the statistical uncertainty in the observed recruitment parameters. (Auth.)

B-51995

De la Mare, W.K., **Estimating krill recruitment and its variability,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.55-69, With French, Russian and Spanish summaries. 7 refs.

A maximum likelihood method is developed for the decomposition of krill density-at-length data into the proportion of recruits in a population sampled by a net haul survey. Preliminary results from a series of five net haul surveys in the South Atlantic and the Indian Ocean give a mean recruitment rate for 1+krill (the ratio of the number of krill aged one year to the number of krill aged one year and above) of 0.339 with a standard deviation (SD) of 0.100. The corresponding result for recruitment for 2+krill (the ratio of the number of two-year old krill to the number aged two and above) from nine surveys is 0.552 with a standard deviation of 0.074. The assumptions needed for reliable results are discussed. (Auth.)

B-51998

Ichii, T., Naganobu, M., Ogishima, T., **Assessment of the impact of the krill fishery on penguins in the South Shetlands,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.107-128, With French, Russian and Spanish summaries. 21 refs.

An assessment of the competition between the Japanese krill fishery and penguins during the penguin breeding season in the South Shetland Is. was made. The krill catch is very low in Dec., while the catch rate for the following three months is roughly constant (3,000 to 10,000 tonnes/10-day period) due to an increase in fishing intensity in areas closer to the northern shelf of either Livingston or Elephant I. In contrast, food consumption by penguins is estimated to be high north of King George, Nelson and Robert islands and around Low and Clarence islands, but small north of Livingston and Elephant islands. Hence, the overlap between the main fishing and foraging areas is insignificant and implies a low level of competition between the fishery and penguins. Krill biomass was estimated to be as large as 200 to 1,500 x 10^3 tonnes within the preferred fishing areas during the breeding season. The present fishery is unlikely to have an adverse impact on the local krill biomass, and hence on penguins, when catch levels are also taken into account. (Auth. mod.)

B-52000

Ashford, J.R., Croxall, J.P., Rubilar, P.S., Moreno, C.A., **Seabird interactions with longlining operations for *Dissostichus eleginoides* at the South Sandwich Islands and South Georgia,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.143-153, With French, Russian and Spanish summaries. 14 refs.

During seven days of operations involving the setting and hauling of longlines to catch the toothfish *Dissostichus eleginoides* around the South Sandwich Is., actual and potential interactions with seabirds were assessed. Bird numbers increased rapidly after dawn and large numbers of Cape, giant and storm petrels and smaller numbers of white-chinned petrels and black-browed albatrosses appeared during day hauling operations. No incidental mortality was seen and only one bird was caught on a hook; nevertheless many species in these aggregations of birds are clearly potentially vulnerable to setting operations in daylight hours. Several species of the seabirds present presumably originated from South Georgia populations; however, wandering and grey-headed albatrosses, whose populations are in serious decline at South Georgia, were rare; their vulnerability to longlining operations in the South Sandwich Is. may therefore be low. Quantitative data and observations of longline vessels fishing around South Georgia, however, indicate significant catch rates of albatrosses. (Auth.)

B-52001

Clarke, J., Kerry, K., **Effects of monitoring procedures on Adélie penguins,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.155-164, With French, Russian and Spanish summaries. 15 refs.

The effects of flipper bands, implanted tags, gastric lavage and external instrument attachment on the performance of Adélie penguins were investigated over three seasons at Béchervaise I., Mac. Robertson Land. The return rates of birds carrying bands and/or implanted electronic transponders were compared to investigate the effects of bands on bird mortality and to determine rates of band and tag loss. There was a slight reduction in return rates of birds banded for more than one season, but no evidence of band or tag loss over a single winter. The attachment of satellite tracking devices during the incubation period resulted in increased foraging trip durations and reduced breeding success. Attachment for single or multiple foraging trips post-hatching caused no significant increase in foraging trip durations. No reduction in fledging rates of chicks from nests of stomach-lavaged birds was detected over two breeding seasons. The implications of these findings for the CCAMLR Ecosystem Monitoring Program are discussed. (Auth.)

B-52002

López Abellán, L.J., Balguerías, E., **On the presence of *Paralomis spinosissima* and *Paralomis formosa* in catches taken during the Spanish survey *Antartida 8611*,** *CCAMLR Science,* Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.165-173, With French, Russian and Spanish summaries. 9 refs.

This paper provides information on antarctic crabs obtained during the 1986 Spanish survey *Antartida 8611*, which covered the shelf around all the archipelagos in the Scotia Sea. Depths surveyed ranged from 63 m down to 643 m. In the area surveyed, the two crab species of the genus *Paralomis (P. spinosissima* and *P. formosa)* were found only around Shag Rocks and South Georgia. The bathymetric distribution of *P. spinosissima* ranged from 160 to 627 m and that of *P. formosa*, far less frequent in the catches, from 320 to 350 m. Field observations showed that these two species were absent from the southern archipelagos of the Scotia Arc (South Orkney, Elephant I. and South Shetland Is.). The location of the hauls where *Paralomis* spp. were found, together with the qualitative composition of the fish fauna usually accompanying them in the catches, suggest that *P. spinosissima* and *P. formosa* tend to concentrate in areas close to the shelf break, where environmental conditions show some degree of stability. (Auth. mod.)

B-52003

Basson, M., **Preliminary investigation of the possible effects of rhizocephalan parasitism on the management of the crab fishery around South Georgia,** *CCAMLR Science*, Sep. 1994, Vol.1, Scientific Committee and the Commission for the Conservation of Antarctic Marine Living Resources. Journal. Edited by E. Sabourenkov, p.175-192, With French, Russian and Spanish summaries. 9 refs.

Relatively high levels of infection by a rhizocephalan barnacle have been found in the population of the crab *Paralomis spinosissima*, which has been harvested by a new fishery around South Georgia since 1992. One of the main effects of the parasite is to render infected animals sterile. Parasitism can therefore reduce the effective spawning stock biomass, which clearly has implications for stock management. The possible implications of parasitism for management are investigated by considering a population model that captures the main characteristics of the system. The effects of harvesting both healthy and infected animals are contrasted with the effects of harvesting healthy animals only. Equilibrium and transition dynamics of the models are explored for ranges of parameter values. Results indicate a need to harvest or remove infected animals from the population. The need is greater when the population is sensitive to declines in spawning stock. Results highlight the importance of incorporating parasitism in the design of a management strategy for this crab population. (Auth. mod.)

B-52012

Marquez, M.E.I., **Electrophoretic determination of plasma proteins in *Notothenia neglecta* and *N. rossii*** [Proteínas plasmáticas de las especies antárticas *Notothenianeglecta* y *Nototheniarossii:* analisis electroforético], *Buenos Aires. Instituto Antártico Argentino. Contribución*, 1994, No.421, 20p., In Spanish with English summary. 17 refs.

Plasma protein fractions from the antarctic species *Notothenia neglecta* and *N. rossii* were determined by electrophoresis on cellulose acetate to establish and quantify its different compounds. The relative mobilities were compared against reference human plasma and serum. A quantitative evaluation was carried out dosing the proteinograms by densitometry and by elution against human plasma and serum, and a commercial standard (Versatol) as controls. Intraspecific and interspecific variations, as well as qualitative and quantitative similarities were found in the electrophoretic profiles of the specimens analyzed. (Auth.)

B-52013

Marquez, M.E.I., **Plasma protein concentration in *Notothenia neglecta* and *N. rossii*** [Estudio preliminar de la concentración de las proteínas plasmáticas en *Notothenia neglecta* y *Notothenia rossii*], *Buenos Aires. Instituto Antártico Argentino. Contribución*, 1994, No.415, 24p., In Spanish with English summary. Refs. p.15-18.

A study of total plasma proteins in *Notothenia neglecta* and *N. rossii* was initiated as part of a systematic research on plasma proteins in fish species from antarctic and subantarctic waters. Determinations of sex, size, and estimations of health, based on the presence of parasites in the liver, and of nutrition, based on stomach contents, were done in the specimens under study. Gonadal and Hepatosomatic indexes were calculated as well as the Mean Condition Factor (K). It is concluded that in fish plasma, proteins show a total protein concentration lower than in mammals; in both species and sexes it was observed that the total plasma protein value in the parasitized specimens was significantly lower than that observed in unparasitized specimens. (Auth.)

B-52035

Convey, P., **Modelling reproductive effort in sub- and maritime antarctic mosses,** *Oecologia*, 1994, 100(1-2), p.45-53, 38 refs.

A comparison is made of the reproductive effort (RE), considered as the investment in sporophyte relative to gametophyte biomass, of 8 species of moss occurring at sub- and maritime antarctic sites. Six of the species showed smaller sporophytes and gametophytes at the climatically more extreme maritime antarctic sites and one species showed no size difference between regions. The remaining species, although showing no regional difference, showed some evidence of a reverse pattern, with higher altitude samples having greater biomass than lower altitude samples. Spore counts indicated a measure of compensation in maritime antarctic samples, with no significant decrease in spore output in several species despite smaller sporophyte biomass. The relationship between sporophyte (S) and gametophyte (G) biomass within samples was described by an allometric curve ($S=aG^b$) which gave a better fit than a straight line for 6 species. This form of model allows comparisons of patterns of RE to be made between samples with non- or partially overlapping size distributions, even when the relationship involves size dependence. Variations in results among some of the species, size distributions, locations, and altitudes are noted and described. (Auth. mod.)

B-52036

Smith, R.I.L., **Vascular plants as bioindicators of regional warming in Antarctica,** *Oecologia*, Oct. 1994, 99(3-4), p.322-328, 46 refs.

Monitoring selected populations of the only two native antarctic vascular plant species *(Colobanthus quitensis* and *Deschampsia antarctica)* over a 27-year period has revealed a significant and relatively rapid increase in numbers of individuals and populations at two widely separated localities in the maritime Antarctic. There is strong evidence that this increase is a response to a warming trend in summer air temperatures, which has been evident throughout the region since the late 1940s, enhancing seed maturation, germination and seedling survival. This study provides the only known long-term monitoring data for any terrestrial organisms in Antarctica. Because their response to ameliorating conditions is more rapid than that of the dominant cryptogamic groups, antarctic phanerogams may be useful bioindicators of climate change in West Antarctica. (Auth. mod.)

B-52053

Smith, R.I.L., ed, Walton, D.W.H., ed, Dingwall, P.R., ed, SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, UK, 29 June-2 July 1992, **Developing the Antarctic Protected Area System. Proceedings,** Cambridge, U.K., IUCN—The World Conservation Union, 1994, 137p., Refs. passim. For selected papers see A-52064, A-52067 through A-52069, B-52054 through B-52063, M-52065 and M-52066.

This volume contains papers presented at the SCAR/IUCN Workshop on Antarctic Protected Areas, held in Cambridge, U.K. on June 29-July 2, 1992. The papers are grouped in 6 chapters headed as follows: Recommendations to the XVII Antarctic Treaty Consultative Meeting, Venice, Nov. 1992; the Antarctic Protected Area System; design and management planning for antarctic protected areas; managing tourism and protecting historical features; international, legal and policy issues; and information and communication. Each chapter ends with a "Summary and conclusions" article based on the preceding discussions.

B-52054

SCAR/IUCN, **Recommendations of the SCAR/IUCN Workshop on Antarctic Protected Areas to the XVII Antarctic Treaty Consultative Meeting, Venice, November 1992,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.3-11.

SCAR and the World Conservation Union (IUCN), as the world's leading non-governmental bodies experienced in antarctic science and conservation, joined forces to discuss the new provisions for special area protection and management under the Protocol and to offer advice to the Treaty Parties on their implementation. Accordingly, a workshop was convened with experts from both organizations, and representatives of some Treaty national authorities. The principal conclusions of the workshop, in the form of recommendations and explanatory commentary, are set out in this paper.

B-52055

Smith, R.I.L., **Introduction to the Antarctic Protected Area System,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.15-26.

An account is given of the history of provisions enacted by the international community for the protection of specific areas within the Antarctic Treaty Area, including the designation of Specially Protected Areas and the Sites of Special Scientific Interest. These are listed with name, location, proposer and approximate area (sq. km) in an appendix. The Antarctic Specially Protected Areas and Antarctic Specially Managed Areas are defined.

B-52056

Smith, R.I.L., **Environmental-geographic basis for the Protected Area System,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.27-36, 2 refs.

The application and review of the SCAR ecosystems classification matrix are discussed, along with the criteria for selecting ASPAs for the protection of biota, habitats and ecosystems. An appendix lists suggested regions where new ASPAs might be designated to improve the geographical representation of protected areas, or where human impact may threaten specific conservation values. Three figures show the proposed antarctic terrestrial, inland water, and marine ecosystems classification matrix.

B-52057

Kriwoken, L.K., Keage, P.L., **Identification and selection of protected areas,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.37-43, 10 refs.

This paper examines key factors in the identification and selection of antarctic protected areas. In doing so it is realized that the study of the Protected Area System provides a valuable and strategic insight into the complexity of antarctic natural resources management. The paper summarizes some key factors in the evolution of the range of protected area categories. The issues affecting identification and selection are discussed, including the contributions and interactions of the agencies involved. Recommendations are made for ways of improving the identification and selection of categories introduced to the Antarctic Treaty Area since 1989.

B-52058

Dingwall, P.R., **Design and delimitation of protected areas,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.49-52, 12 refs.

General guidelines are proposed concerning the size and extent, shape and boundary location and marking of protected areas. Revised Treaty provisions for protected area design are cited.

B-52059

Clarkson, P.D., **Maps required for protected areas,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.53-55.

The purpose of this account is to provide some guidelines for drafting acceptable maps to enable the designated protected area to be readily identifiable from the maps. It is suggested that ideally, three maps should be provided: an index map of Antarctica to locate the particular region on the continent; an index map of the region to locate more closely the protected area and the position of the third map; and a large-scale map of the protected area and its immediate environs.

B-52060

Penhale, P.A., Hofman, R.J., **Site surveillance and regulation of use of protected areas,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.57-60.

In the light of some weaknesses in the present Protected Area System, which are reviewed, the authors suggest that the Antarctic Treaty Parties take several actions, individually and collectively. To assist the Parties to implement the provisions of Protocol Annex V, four recommendations are made: develop an effective permit system, provide information and education, improve site surveillance, and improve exchange of information.

B-52061

Bonner, W.N., **Active management of protected areas,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.61-65.

The legal mechanism for active management of protected areas is outlined, with emphasis on the following essentials that it should cover: definition of objective, site boundary and zone markers, recording and auditing, system manipulation, and application of active management. It is pointed out that almost any active management activity is likely to be expensive in terms of logistic support.

B-52062

Smith, R.I.L., **Role of COMNAP in implementing Annex V of the Protocol on Environmental Protection to the Antarctic Treaaty,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.67-71.

In outlining the role of the Council of Managers of National Antarctic Programmes in managing protected areas, the following essentials are discussed: identification of sites and demarcation of site boundaries, issues of permits, monitoring visits to protected areas, inspection and maintenance of protected areas, and education and consultation. Six recommendations to be considered by COMNAP conclude the article.

B-52071

Ahn, I.Y., **Ecology of the antarctic bivalve *Laternula elliptica* (King and Broderip) in Collins Harbor, King George Island: benthic environment and adaptive strategy,** *Tokyo. National Institute of Polar Research. Memoirs. Special issue,* Aug. 1994, No.50, International Workshop on Holocene Environmental Changes in Antarctic Coastal Areas, Tokyo, Oct. 20-22, 1993. Proceedings. Edited by P.A. Berkman and Y. Yoshida, p.1-10, 26 refs.

The antarctic lamellibranch *Laternula elliptica* occurs commonly in shallow waters around the antarctic continent and islands. Physical and chemical characteristics of the bottom environment of a representative habitat were investigated to understand the successful adaptation of this species in the antarctic nearshore waters. A high density of *L. elliptica* (average 87 ind./m^2, approx. 9 kg/m^2) occurred at 25-30 m water depth of Collins Harbor, a sheltered bay with a wide area of exposed rocky beach during summer. Bottom substrate was sandy mud mixed with gravel particles. *L. elliptica* was not found at depths less than 5 m (pebble zone), indicating that physical instability due to ice abrasion may be a factor determining the upper limit of vertical distribution of this species. Deep burrowing seems to be primarily a means for avoiding ice impacts. A pair of stout and highly extendable siphons appear to be a morphological feature to feed in the ice-scoured substrate while staying deep in the sediment. The present study suggests that a trade-off between increasing physical stability and decreasing food input with depth may determine both the depth range of vertical distribution and the magnitude of *L. elliptica* biomass. (Auth. mod.)

B-52077

Mein, B., **Contribution to the knowledge of antarctic starfishes (Asteroidea, Echinodermata)** [Beitrag zur Kenntnis antarktischer Seesterne (Asteroidea, Echinodermata)], *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut,* Nov. 1992, vol.89, p.239-259, In German with English summary. 38 refs.

The present paper deals with Asteroidea collected in Antarctica during two voyages of FS *Polarstern* and one of the FFS *Walther Herwig.* The material was collected by grab samples, samples with the Agassiz-Trawl and net samples. The systematic part deals with 41 species and 3 subspecies of 28 genera in 13 families. Two probably new species are described but remain in open nomenclature. Comments on the morphology, ecology and biology are given. The geographical distribution is discussed. (Auth.)

B-52078

Andres, H.G., Rauschert, M., **New stenothoids of the genus *Torometopa*** Barnard & Karaman, 1987 from antarctic waters (Crustacea: Amphipoda: Gammaridea) [Neue Stenothoiden in der Gattung *Torometopa* Barnard & Karaman, 1987 aus antarktischen Gewässern (Crustacea: Amphipoda: Gammaridea)], *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut,* 1992, vol. 89, p.157-174, In German with English summary. 8 refs.

Retouching those Discovery-specimens underlying K.H. Barnard's assignment (1932) to *Torometopa crenatipalmata* (Stebbing, 1888) lead to the establishment of the new species *Torometopa crypta.* A further new species, *Torometopa elephantensis,* is described on the basis of specimens sampled by box corer in the area around Elephant I. during *Walther Herwig* cruise 68 (1984-85). (Auth.)

B-52079

Hartmann-Schröder, G., Rosenfeldt, P., **Polychaetes of the *Polarstern*** Cruise ANT V/1 to Antarctica in 1986. Part 1: Euphrosinidae to Iphitimidae [Die Polychaeten der *Polarstern*-Reise ANT V/1 in die Antarktis 1986. Teil 1: Euphrosinidae bis Iphitimidae], *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut,* Nov. 1992, Vol.89, p.85-124, In German with English summary. 47 refs.

The present paper deals with 17 families of polychaetes collected during the voyage of R/V *Polarstern* from May 5 to June 13, 1986. Seventy-one species were found, 59 of them were already known and 9 species were new to science and described: *Euphrosine cirribranchis, E. antarctica, Lacydonia elongata, Gyptis gracilis, Pionosyllis elephantensis, Sphaerosyllis palpopapillata, Aglaophamus paramalmgreni, Abyssoninoe orensanzi,* and *Coralliotrocha composita.* Three species could not be determined to species level because of incompleteness. (Auth.)

B-52080

Smith, G.T., Wingfield, J.C., Veit, R.R., **Adrenal response to stress in the common diving petrel, *Pelecanoides urinatrix*,** *Physiological zoology,* Mar./Apr. 1994, 67(2), p.526-537, 14 refs.

In this study, free-living common diving petrels *Pelecanoides urinatrix,* captured at sea off South Georgia I., showed highly significant elevations of circulating corticosterone levels after capture and handling stress. Plasma concentrations of corticosterone rose from a baseline of about 10 ng/mL immediately after capture to a peak of ca. 40 ng/mL within 30 min. There were no apparent differences between the sexes. During a severe storm on July 5, 1991, birds had significantly elevated levels of circulating corticosterone immediately after capture. There was no further increase in plasma levels of corticosterone, which suggests that these birds were already maximally stressed when captured. Body mass of birds captured during the storm was lower than during calm weather. In calm weather there was a significant negative relationship of maximum corticosterone level generated during capture stress to the ratio of body mass to wing chord cubed (a measure of body condition). No such relationship was observed during stormy weather. (Auth. mod.)

B-52081

Ryan, P.G., Watkins, B.P., **Snow petrel breeding biology at an inland site in continental Antarctica,** *Colonial waterbirds,* 1989, 12(2), p.176-184, 34 refs.

The breeding biology of Snow petrels at Roberts Knoll, a group of nunataks 130 km from the ice-shelf front in western Queen Maud Land, is compared with breeding biology at coastal sites. The estimated breeding population of 600 pairs is confined to three of five major nunataks. Nunatak structure, specifically the enhanced protection from drift snow at elevated sites, apparently determines colony dispersion. Birds were incubating when the study started; the first chicks were found on 17 Jan. and hatching probably commenced on 15 Jan., which suggests that egg-laying started at the beginning of Dec. Capture resulted in at least 44% of incubating birds deserting. Incubation shifts of marked birds averaged 8.4 days (range 6-10, excluding the short pre-hatching shift), and brooding lasted between 6.5 and 8 days in two or three shifts. The duration of incubation and brood shifts are similar to those of nominate race birds breeding at the coast in Princess Elizabeth Land, but are almost twice as long as those of the large race *P. n. major* breeding at the Adélie Land coast. This racially consistent difference in the duration of incubation and brood shifts, irrespective of colony distance from the sea, lends support to the hypothesis that there were formerly two isolated populations of Snow petrels. (Auth. mod.)

B-52082

Ellis-Evans, J.C., Bayliss, P.R., **Biologically active micro-gradients in cyanobacterial mats of antarctic lakes and streams,** *Verhandlungen des Internationalen Vereinigung für theoretische und angewandte Limnologie,* Dec. 1993, Vol.25, p.948-952, 19 refs.

Microprobe techniques have been employed to examine the micro-gradients present in benthic cyanobacterial mats and sediments of maritime antarctic lakes and streams. Light penetration was greater in stream mats than in lake mats because of higher incorporation of inorganic material in the latter. Maximum photosynthetic rates were recorded sub-surface in stream mats which are subjected to high levels of solar radiation. An obvious orange-red layer of carotenoids was observed in the top 1 mm of these mats, overlying a blue-green sub-surface zone. Lake mats showed no obvious carotenoid pigmentation and pigment analysis confirmed normal chlorophyll *a*:carotenoid ratios. This would suggest that the carotenoids have a protective function in stream mats. Oxygen microprofiles indicated aerobic conditions throughout the stream mat vertical profile. A significant vertical component of lake mats lay beneath the photic zone and was therefore heterotrophic. Oxygen profiles indicated that a chemically reduced zone existed within the mats studied and the use of a nitrate electrode indicated that nitrate was also largely consumed within the mat profile. *In situ* measurements of oxygen profiles in an ice-covered lake indicated a substantial diffusive boundary layer in excess of 2 mm which would have severely restricted oxygen diffusion into the mats and thus accelerated the process of winter anoxia in these sediments. (Auth. mod.)

B-52083

Adams, N.J., Klages, N.T.W., **Temporal variation in the diet of the Gentoo Penguin *Pygoscelis papua*** at subantarctic Marion Island, *Colonial waterbirds,* 1989, 12(1), p.30-36, 29 refs.

The diet of the Gentoo penguin at Marion I. was sampled by stomach pumping at monthly intervals from Mar. 1984 to Mar. 1985. Overall, fish accounted for 53% of the diet by mass, crustaceans 44% and cephalopods 2%. Crustaceans predominated between Mar. and June 1984; a marked increase in the proportion of fish in July coincided with the start of egg laying. Fish accounted for almost all of the diet in Jan. and Mar. 1985. Juvenile nototheniid fish, in particular *Notothenia squamifrons,* formed the bulk of the fish component; myctophids and *Channichthys rinoceratus* were less common. The pelagic euphausiid *Euphausia vallentini* accounted for about 50% by mass of the overall crustacean component lumped over the entire study period. The decapod shrimp *Nauticaris marionis* was the most important crustacean species consumed during June to Sep. 1984. Cephalopods, predominantly octopods, were taken mainly in Feb. and Mar. 1985. The hypothesis that seasonal changes in diet occur in direct response to the arrival of crested penguins *(Eudyptes* spp.) early in summer is not supported by the data. Changes in diet appear to reflect local changes in the availability of prey species within the inshore waters exploited by Gentoo penguins. (Auth. mod.)

B-52084

Kooyman, G.L., Ponganis, P.J., **Emperor penguin oxygen consumption, heart rate and plasma lactate levels during graded swimming exercise,** *Journal of experimental biology,* Oct. 1994, Vol.195, p.199-209, 31 refs.

DLC QH301.J68 vol.195 1994

Oxygen consumption (V_{O2}), heart rate and blood chemistry were measured in four emperor penguins, (Gray), during graded swimming exercise. The maximum V_{O2} obtained, 52 ml O_2/kg/min, was 7.8 times the measured resting V_{O2} of 6.7 ml O_2/kg/min and 9.1 times the predicted resting V_{O2}. As the swimming effort rose, a linear increase in surface and submerged heart rates (fH) occurred. The highest average maximum surface and submersion heart rates of any bird were 213 and 210 beats/min, respectively. No increase in plasma lactate concentrations occurred until V_{O2} was greater than 25 ml O_2/kg/min. At the highest V_{O2} values measured, plasma lactate concentration reached 9.4 mmol/l. In comparison with other animals of approximately the same mass, the aerobic capacity of the emperor penguin is less than those of the emu and dog but about the same as those of the seal, sea lion and domestic goat. For aquatic animals, a low aerobic capacity seems to be consistent with the needs of parsimonious oxygen utilization while breath-holding. (Auth.)

B-52086

Lizotte, M.P., Priscu, J.C., **Natural fluorescence and quantum yields in vertically stationary phytoplankton from perennially ice-covered lakes,** *Limnology and oceanography,* Sep. 1994, 39(6), p.1399-1410, 32 refs.

Phytoplankton in ice-covered lakes near McMurdo Sound are stratified vertically in distributions similar to deep chlorophyll maxima commonly observed in lakes and seas. Measurements were made of natural fluorescence flux rates, chlorophyll concentration, phytoplankton absorption spectra, photosynthetic efficiency, and spectral irradiance to derive the quantum yields for photosynthesis and fluorescence. Chlorophyll concentrations predicted from natural fluorescence based on mean phytoplankton absorption spectra correlated significantly with measured chlorophyll concentration. Predictions of primary productivity from natural fluorescence based on mean values for fluorescence and photosynthesis were poor. Relationships between photosynthesis:fluorescence and temperature and between fluorescence:photosynthesis and irradiance implied that these environmental variables would not provide good bases for correcting predictions of primary production. Photosynthesis:fluorescence varied most coherently with distance from the nutricline, due primarily to a large increase in maximum photosynthesis with proximity to the nutricline. Results indicate that nutrient supply may be a critical variable to consider when using natural fluorescence methods to estimate primary productivity in vertically stable phytoplankton. (Auth. mod.)

B-52099

Bresciani, J., Lützen, J., **Morphology and anatomy of *Avdeevia antarctica,* new genus, new species (Copepoda: Harpacticoida: Tisbidae), parasitic on an antarctic cephalopod,** *Journal of crustacean biology,* Nov. 1994, 14(4), p.744-751, 8 refs.

The external morphology and internal anatomy are described of the female of *Avdeevia antarctica,* a new genus and species of harpacticoid copepod, parasitic on the antarctic octopodan cephalopod *Megaleledone senoi.* It is distinguished from related genera of the subfamily Cholidyinae by its proportionately much larger body and reduced number of legs. The species is attaches to the gill of its host and feeds upon the blood. (Auth.)

B-52117

Rat'kova, T.N., **Distribution and composition of phytoplankton in Ardly Bay (King George Island, Antarctica),** *Oceanology,* Dec. 1993, 33(3), p.316-319, Translated from Okeanologiia. 18 refs.

Phytoplankton composition was shown to be homogeneous when Ardly Bay was ice-free and its waters were well mixed; some benthic and epiphytic algae were abundant in shallow waters. The number of phytoplankton dropped sharply toward the end of fall, from 1.6 million cells/L in Mar. to 10,000-20,000 cells/L in May, and maintained the latter concentration during winter. The fluctuating concentration of individual species, the presence of dividing cells, and the succession of species demonstrated the active state of the phytoplankton. The shallow depth of the bay is the most important factor for phytoplankton development in winter in the near-shore areas because light can penetrate the entire mixed water column, providing an illumination level that is sufficient for the algae growth. Nanophytoplankton dominated in the plankton in winter because it uses weak light more efficiently and consumes mainly ammonia, thus saving up to one third of the energy required to restore nitrates. (Auth. mod.)

B-52118

Lopukhin, A.S., **Weddell Sea microplankton (Antarctica): concentration of intracellular adenozine triphosphate and chlorophyll a: size spectra of parameters,** *Oceanology,* Dec. 1993, 33(3), p.320-328, 23 refs.

The chlorophyll *a,* adenosine triphosphate (ATP) concentration, and size structure of microplankton were investigated Jan. to Apr. 1989 in the Indian Ocean and in the Weddell Sea. ATP values varied from 11 to 92 ng/L, and chlorophyll concentrations varied from 0.04 to 0.27 mg/m^3 in the Indian Ocean, with prevailing nanoplankton and picoplankton fractions. Both ATP and chlorophyll concentration increased 2 times south of 40°S; they exceeded 400 ng/L and 0.6 mg/m^3, respectively, in the Weddell Sea. Cells of nanophytoplankton and microphytoplankton (mainly diatoms) prevailed in size spectra. The spatial variabilities of the parameters were within one order of magnitude; their values decreased by 3-4 times in 1 month. Size structure changed due to increased portion of nanoplankton and picoplankton. (Auth. mod.)

B-52120

Child, C.A., **Antarctic and subantarctic Pycnogonida: Ammotheidae and Austrodecidae,** *American Geophysical Union. Antarctic research series,* July 22, 1994, Vol.63, Biology of the antarctic seas 23, 99p., Refs. p.97-99.

DLC QH95.58.B56

Thirty-nine species of Pycnogonida in 8 genera belonging to the family Ammotheidae from antarctic and subantarctic localities are discussed with new records reported for each species. A key to the ammotheid genera and keys to 6 of the 8 species groups found in antarctic waters and treated in this report are presented. Three of the *Ammothea* and one of the *Achelia* species are fully described and illustrated as new. A historical background is given for this first of a series of monographs on antarctic and subantarctic pycnogonids. Each of the species represented is diagnosed and its distribution as currently known is given. The relationships of the new species are discussed, and all 17 species are diagnosed, described, and illustrated, with the zoogeographic distribution of each included. (Auth. mod.)

B-52124

Bowles, A.E., Smultea, M., Würsig, B., DeMaster, D.P., Palka, D., **Relative abundance and behavior of marine mammals exposed to transmissions from the Heard Island Feasibility Test,** *Acoustical Society of America. Journal,* Oct. 1994, 96(4), p.2469-2484, 31 refs.

The Heard Island Feasibility Test source transmitted a hum at 209-220 dB *:* 1 microPa at 175 m depth, centered on 57 Hz with a maximum bandwidth of 30 Hz for 1 hr of every 3. Experienced marine mammal observers conducted line-transect surveys and monitored marine mammal behavior visually and acoustically in a 70x70 km sq centered on the transmission site. Thirty-nine groups of cetaceans and 19 of pinnipeds were sighted during transmissions. The density of all cetaceans was 0.0157 groups/km^2 before the transmissions and 0.0166 groups/km^2 during. Antarctic fur seals and southern elephant seals were seen, but not in sufficient numbers to estimate abundance. One blue whale tracked before, during and after a transmission changed respiration and reorientation rates, but did not avoid the source detectibly. Sperm whales and pilot whales were heard in 23% of 1181 min of baseline acoustic surveys, but in none of 1939 min during the transmission period. Both species were heard within 48 h after the end of the test. (Auth. mod.)

B-52125

Pakhomov, E.A., **Diurnal vertical migrations of antarctic macroplankton: *Salpidae Ctenophora, Siphonophora, Chaetognatha, Polychaeta, Pteropoda,*** *Oceanology,* Feb. 1994, 33(4), p.510-511, Translated from Okeanologiia. 1 ref.

Materials collected from Feb. to Apr. 1989 on the 43rd cruise of the R/V *Dmitriy Mendeleyev* on a section along 15°E between 52 and 71°S, and also in the neighborhood of Mordvinov I. and Bransfield Strait, were analyzed. The macroplankton was collected during the daytime and nighttime using a closing Mel'nikov trawl in the layer 0-200 m at 5-10 horizons. Three types of vertical distribution were discovered for the 12 investigated species of macroplankton at different times of day: 1) ordinary migration, rising toward the surface at nighttime and descending into the lower-lying layers during daytime; 2) absence of diurnal vertical migrations with a predominant concentration of plankters in the layer with reduced water temperatures; 3) absence of diurnal vertical migrations with predominant concentration in warm deep waters. (Auth. mod.)

B-52129

Huntley, M.E., Nordhausen, W., **Ammonium cycling by antarctic zooplankton in winter,** *Marine biology,* Jan. 1995, 121(3), p.457-467, 54 refs.

Results of an investigation of the elemental composition and ammonium excretion rates of three species of southern ocean copepods, ostracods and two species of euphausiids collected west of the Antarctic Peninsula in midwinter are presented. At most stations the ocean was completely covered by sea ice, and only negligible quantities of phytoplankton were present in either the ice or the water column. Particular attention was given to determining the appropriate durations and stocking densities for shipboard experiments. Comparisons are made to summer excretion rates, and the results are considered with respect to differences in overwintering strategies between species. (Auth. mod.)

B-52136

Barnes, D.K.A., **Communities of epibiota on two erect species of antarctic bryozoa,** *Marine Biological Association of the United Kingdom. Journal,* Nov. 1994, 74(4), p.863-872, Refs. p.871-872.

Two erect species of bryozoans, *Alloeflustra tenuis* (Kluge) and *Nematoflustra flagellata* (Waters), occur abundantly in similar localities on Signy I. Both species are unilaminar and are colonized by a range of epibiotic taxa, principally other cheilostome bryozoans. A detailed study was undertaken of the bryozoan epibiota of these two species, collected over the depth range 36 to 40 m. The degree of colonization varied with host size and differed between the front and rear surfaces of each host species, and between host species. The species composition of the epibiota was also different between species and between surfaces within species. These variations are possibly related to differences between the host species in the abundance, structure and function of avicularia (putative protective structures). Specimens from deeper water (150 m) showed significantly reduced colonization by epibiota, but the same overall patterns of colonization between the two species and surfaces were still observed. (Auth.)

B-52137

Pagès, F., Pugh, P.R., Gili, J.M., **Macro- and megaplanktonic cnidarians collected in the eastern part of the Weddell Gyre during summer 1979,** *Marine Biological Association of the United Kingdom. Journal,* Nov. 1994, 74(4), p.873-894, Refs. p.892-894.

The species composition, abundance and spatial distribution of macroplanktonic cnidarians in the eastern part of the Weddell Gyre are described from a series of nekton samples collected over three depth ranges between 0 and 2000 m. On average, cnidarians contributed 52.6% to the biovolume of these samples, although the range was high (5.0-93.1%). In total 23 species of siphonophores and 20 species of medusae were identified. There was a high diversity at bathypelagic depths, with 38 species being collected below 1000 m. The most abundant siphonophores were *Dimophyes arctica* and *Heteropyramis crystallina.* The most abundant medusa was *Pantachogon haeckeli.* Medusae were most abundant at mesopelagic depths. Smaller calycophoran siphonophores were concentrated in the top 500 m of the water column. The number of larger calycophorans increased with depth. Although many species had a widespread geographical distribution within the sampling area, the hydrographical conditions appeared to be affecting the distribution of some. (Auth. mod.)

B-52153

Cabrera S., S., Pizarro N., G., **UV radiation on King George Island during the ozone depletion of 1992** [Radiación UV en Isla Rey Jorge durante la disminución de ozono estratosférico antártico en 1992], *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1994, No.44, p.39-51, In Spanish with English summary. Refs. p.50-51.

Global UV radiation at 3 wavelengths was measured in the Lake Kitezh area (King George I.) during Sep. and Oct. 1992. The results correlate highly with the total ozone measurements taken from Marambio Station and those presented in the TOMS system maps (NASA). The daily decrease of stratospheric ozone in the area provokes acute short-term biological changes which reach photon flow densities corresponding to the summer season. These biological events represent a risk for photosynthetic organisms emerging from a long winter into high solar radiation intensities. For aquatic biota, the biological consequences of short-term intense periods of UV-B radiation should vary in comparison with the natural, gradual increase of seasonal solar radiation from winter to summer. The authors conclude that it is necessary to carry out more studies in order to evaluate the effect of short and long-term increase in UV-B radiation on living organisms. (Auth. mod.)

B-52154

Martínez, G., Marticorena, A., Rodríguez, R., Larraín, A., **Stem and leaf study of *Colobanthus quitensis* (Kunth) Bartl. from King George I.** [Estudio anatómico del tallo y hoja de *Colobanthus quitensis* (Kunth) Bartl. en isla Rey Jorge, Antártica], *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1994, No.44, p.53-59, In Spanish with English summary. 14 refs.

Colobanthus quitensis (Kunth) Bartl. along with *Deschampsia antarctica* Desv. are the only phanerogams present in the vegetation of the antarctic continent. The physiological, ecological, reproductive and taxonomic characteristics of both species have been studied extensively. However, the anatomy has been neglected until now. By means of the analysis of stem and leaf tissues of *C. quitensis* it is concluded that these characters permit a higher efficiency in the utilization of water resources by this plant, and are also responsible for better insulation and temperature regulation, which are vital strategies for the survival of this plant under severe conditions of the antarctic climate. (Auth.)

B-52155

Casaretto, J.A., Corcuera, L.J., Serey, I., Zúñiga, G.E., **Size structure of tussocks of a population of *Deschampsia antarctica* Desv. in Robert Island, maritime Antarctica,** *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1994, No.44, p.61-66, With Spanish summary. 5 refs.

The distribution and size structure of tussocks of the population of *Deschampsia antarctica* Desv. was studied on the Coppermine Peninsula, Robert I. Different study sites showed predominance of smaller turfs. This suggests that *D. antarctica* is a colonizing species in the peninsula. The plant was found in small patches on 15 sites, with a total amount of tussocks on the island less than 10,000 specimens. Coverage by *D. antarctica* in these patches ranged from 0.18 to 1.96%. *Colobanthus quitensis* (Kunth) Bartl. was not found in Robert I. (Auth.)

B-52156

Hanelt, D., Jaramillo M., J., Nultsch, W., Senger, S., Westermeier, R., **Photoinhibition as a regulative mechanism of photosynthesis in marine algae of Antarctica,** *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1994, No.44, p.67-77, With Spanish summary. Refs. p.75-77.

Photosynthetic activity, photoinhibition and recovery of photosynthesis in the brown alga *Adenocystis ultricularis* and in the red alga *Palmaria decipiens* were studied on King George I. in Feb. 1993. The kinetics of photoinhibition and recovery of photosynthesis were very fast at low water temperature. The brown alga *A. utricularis* reacts faster than the brown macroalgae of tropic and moderate latitudes. A comparison of the reactivity to changing light conditions of the intertidal *A. utricularis* and *P. decipiens* with maximal growth rate in the subtidal zone shows that the brown intertidal alga responds to a strong light stress much faster and with a higher photoinhibitory degree than the red alga. In addition, recovery of the brown intertidal alga is much faster than the recovery of *P. decipiens.* This indicates that a relation between photoinhibition and zonation of these algae exists. Both algal species can cope with excessive light conditions as a result of photoinhibition. (Auth. mod.)

B-52158

Aguayo L., A., Torres N., D., **Sightings of the Ross seal *Ommatophoca rossi* along the Antarctic Peninsula** [Avistamientos de focas de Ross, *Ommatophoca rossi* en el Sector Antártico Chileno], *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1994, No.44, p.87-90, In Spanish with English summary. 16 refs.

Only a few sightings of the Ross seal species, no more than 500 until 1980, have been made, compared with numerous records of the other pagophilic seals. In the Chilean Antarctic Territory only 10 of these sightings have been recorded. Therefore, it is important to report three sightings made by national scientists between 1965-1994. These records are evidence of the limited entrance to the dense pack-ice habitat of this species. It is concluded that the international program APIS is important in determining the distribution and abundance of this and other species of pagophilic seals. (Auth. mod.)

B-52159

Aguayo L., A., **Is there a population of Minke whale that overwinter among the antarctic sea ice,** *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1994, No.44, p.91-98, With Spanish summary. 10 refs.

It is well known that Minke whale populations in the Southern Hemisphere congregate in areas of food concentrations in Antarctica during summer. However, the author reports that in the winter of 1993, from Aug. 18 to Sep. 29, he registered 37 sightings, with a total of 211 Minke whales seen in antarctic waters from the R/V *Nathaniel B. Palmer.* The unusual winter sightings are discussed.

B-52161

Priddle, J., et al, **Nutrient cycling by antarctic marine microbial plankton,** *Marine ecology progress series,* Jan. 12, 1995, 116(1-3), p.181-198, Refs. p.196-198.

Three sites along a shelf to deep-sea transect near South Georgia were sampled in the latter part of the austral summer for water column structure, inorganic nutrients, particulate material and microplankton. In most cases, peak concentrations of ammonium were found to be associated with the pycnocline, suggesting that remineralization of nitrogen was occurring here. However, no component of the microbial community could be associated with this region of ammonium production. Carbon fixation over the growing season predicted from published instantaneous nitrogen uptake rates, from biological nitrate deficit in the mixed layer and from the corresponding silicate deficit suggested that at least 25 g C/m^2 was produced by phytoplankton during the growth season. However, there is strong evidence that this is a serious underestimate. Even whilst nitrate concentrations remained high, ammonium and possibly other recycled nitrogen appeared to be key inorganic nutrients. Particulate carbon and silicon appeared to be removed from the mixed layer whilst nitrogen was regenerated *in situ.* In such systems, nitrate removal does not indicate carbon export, and nitrogen recycling may be a crucial factor in determining productivity throughout the growing season. (Auth. mod.)

B-52163

Warén, A., Lewis, L.M., **Two new species of eulimid gastropods endoparasitic in asteroids,** *Veliger,* Oct. 3, 1994, 37(4), p.325-335, 7 refs.

Two new species of the genus *Asterophila* Randall & Heath, 1912 (Prosobranchia, Eulimidae) are described, *A. perknasteri* from the antarctic starfish *Perknaster* sp. (Valvatida, Ganeriidae) and *A. rathbunasteri* from the californian starfish *Rathbunaster californicus* Fischer, 1906 (Forcipulatida, Asteriidae). A third species of *Asterophila* is reported from *Freyella* sp. (Brisingida, Brisingidae), from the southern part of the Kermadec Trench, but is not described. (Auth.)

B-52164

Schnack-Schiel, S.B., Hagen, W., **Life cycle strategies and seasonal variations in distribution and population structure of four dominant calanoid copepod species in the eastern Weddell Sea, Antarctica,** *Journal of plankton research,* Nov. 1994, 16(11), p.1543-1566, Refs. p.1564-1566.

The dominant antarctic copepod species *Calanoides acutus, Calanus propinquus, Rhincalanus gigas* and *Metridia gerlachei* were investigated with respect to their abundance, vertical distribution, developmental stage composition, dry weight and lipid content. The specimens were sampled during three expeditions to the eastern Weddell Sea in summer, late winter/early spring and autumn, between 0 and 1000 m depth. Three species were most abundant in Apr.; only *C. propinquus* reached highest concentrations in Feb. A seasonal migration pattern was evident in all 4 species, but was most pronounced in *C. acutus.* In Oct./Nov. they inhabited deeper water layers; their ascent started by mid-Nov. and in mid-Feb. the species concentrated in the upper 50 m, except for *M. gerlachei* (50-100 m). Their descent was observed in Apr./May. The stage composition changed dramatically with the season, the older developmental stages (CIII-CVI) dominated the populations in late winter/early spring, whereas younger stages (CI and CII) prevailed during summer *(C. acutus, C. propinquus)* or autumn *(R. gigas, M. gerlachei).* Only *C. acutus* ceased feeding in autumn and diapaused at depth. (Auth. mod.)

B-52170

Peck, L.S., Robinson, K., **Pelagic larval development in the brooding antarctic brachiopod *Liothyrella uva*,** *Marine biology,* Sep. 1994, 120(2), p.279-286, Refs. p.285-286.

Larvae of the antarctic brachiopod *Liothyrella uva* (Broderip, 1833) were released by brooding females between 10 and 15 Jan. 1992. They were collected and cultured for the ensuing 45 d. At release they were at the gastrula stage, and were recognizable as the usual brachiopod three-lobed larva from around 18 d after release. At about 22 d post-release, larvae began to congregate under shell fragments placed in culture vessels as potential settlement substrata. However, the larvae showed no signs of settlement which, combined with the absence of many of the attributes of mature larvae seen in previous studies, was taken as evidence that these larvae had not reached fully competent stages. Previous work had shown that *L. uva* spawns in Oct., indicating that the developmental period lasts for a minimum of between 115 and 160 d. The release and subsequent development of larvae also shows that what was previously thought to be a brooding species combines a long brooding period with a free-swimming phase. If this is true of other brachiopod species, then there may need to be a recategorization of some species from brooding to combined brooding and free-swimming developmental types. (Auth. mod.)

B-52171

Moloney, C.L., Cooper, J., Ryan, P.G., Siegfried, W.R., **Use of a population model to assess the impact of longline fishing on wandering albatross *Diomedea exulans*** populations, *Biological conservation,* 1994, 70(3), p.195-203, 39 refs.

An age-structured model of wandering albatross population is developed to simulate population trends over time, using demographic parameters from the population at Possession I., Crozets, during 1968-1986. The simulation results portray a population decreasing at a rate of 2.29% per year, which concurs with global population trends. Sensitivity analyses of model parameters indicate that both adult and juvenile mortality are contributing to the decrease. Wandering albatross mortality is presumed to have increased as a result of deaths caused by longline fishing vessels; such deaths are likely to be relatively more frequent among young, naive birds. The model is used to investigate the potential impacts of new longline fisheries such as that for the Patagonian toothfish in Antarctica. Assuming longline fishing operations affect juveniles more than adults, there is a time lag of 5-10 years before further decreases in population numbers are reflected in the breeding population. Also, because wandering albatrosses are long-lived, population growth rates take approximately 30-50 years to stabilize after a perturbation. Consequently, caution must be exercised when interpreting population trends; short-term (<20 year) estimates may not provide good indications of long-term trends. (Auth.)

B-52175

Veit, R.R., **Pelagic communities of seabirds in the South Atlantic Ocean,** *Ibis,* Jan. 1995, 137(1), p.1-10, 29 refs.

This paper presents quantitative analyses at the community level of the spatial dispersion of 44 species of pelagic birds in the South Atlantic Ocean. The investigation considered the extent to which assemblages of pelagic bird species are influenced by the combined influences of the abundances of other species and the physical structure of the pelagic environment. Results are based upon strip transects collected from oceanographic research vessels during the five consecutive austral summers of 1982-1986. The distributions of most seabird species were statistically independent of the distributions of other species. Species assemblages, however, did occur and were correlated with the physical structure of the ocean. The study area was divided into four zones, each defined by a distinctive assemblage of birds. Physical oceanography proved to be important in determining the species composition of each zone. These relationships were apparent despite the potentially confounding influence of large numbers of immatures and non-breeding adults. (Auth.)

B-52177

Szymczyk, S., Kajfosz, J., Olech, M., **Air pollution studies by PIXE and PIGE analysis of lichens,** [Poland.] Institute of Nuclear Physics. Annual report, [Krakow], 1991, 2 leaves, 3 refs.

Experimental studies on King George I. gave evidence that lichens transported to bases from unpopulated antarctic areas provided an avenue for assessing anthropogenic air pollution at the bases.

B-52180

Donner, B., Wefer, G., **Flux and stable isotope composition of *Neogloboquadrina pachyderma* and other planktonic foraminifers in the southern ocean (Atlantic sector),** *Deep-sea research. Part I,* Nov./Dec. 1994, 41(11/12), p.1733-1743, 25 refs.

Planktonic foraminifers were collected with time-series sediment traps in Bransfield Strait, northern Weddell Sea, and near Maud Rise. Seasonal flux patterns of planktonic foraminifers are similar to total flux patterns. The dominant species was the left-coiling *Neogloboquadrina pachyderma.* At the Maud Rise, in an open-ocean polynya, *Turboratalita quinqueloba, Globigerinita glutinata* and *Globigerinoides ruber* (white) also were abundant. δ^{18}O values of *N. pachyderma* ranged from 3 to 3.6 per mill, corresponding to an apparent temperature range of about 3°C. The smaller size classes showed the lower δ^{18}O values. Oxygen isotope variability between size classes and during the year are explained by seasonal changes in temperature and vital effect. δ^{13}C values of the foraminifer shells ranged from 0.1 to 1.1 per mill. The largest sizes had the highest and the smallest sizes the lowest values. Changes in the deviation from thermodynamics equilibrium during bio-mineralization seem to be involved in this pattern of ^{13}C/^{12}C ratios. (Auth.)

B-52181

Huiskes, A., Gremmen, N., Francke, H., **Life at the margin** [Leven in de marge], *Natuur & techniek,* June 1993, 61(6), p.468-479, In Dutch. 6 refs.

This photoessay provides an overview of life- and other forms at the edge of the antarctic continent and in the surrounding waters. The life forms include mosses, lichens, young and older birds, particularly penguins and skuas. Various rocks comprise "other forms," while some of the human activities are recorded in scenes of science investigations in progress. Many faces of the coastal waters are included.

B-52192

Feller, G., Poncin, A., Aittaleb, M., Schyns, R., Gerday, C., **Blood proteins of the antarctic icefish *Channichthys rhinoceratus*: biological significance and purification of the two main components,** *Comparative biochemistry and physiology,* Sep. 1994, 109B(1), p.89-97, 29 refs.

The lack of hemoglobin and of carbonic anhydrase in the blood of icefish suggest that substantial adaptations of the acid-base balance should occur in order to ensure blood pH homeostasis. The level of peptidic histidyl and of reactive -SH groups per unit of body mass in icefish plasma are 12-13 times higher than those of *Notothenia rossii,* a common red-blooded antarctic species. It is proposed that the high level of imidazole ring in icefish plasma improves the non-bicarbonate buffering capacity and that the reactive sulfhydryls are involved in a redox buffer as in some other hypoxia-tolerant species. After plasma fractionation on Ultrogen AcA 34, the two main icefish serum proteins were purified by DEAE cellulose chromatography (IFI) and by HPLC on anion exchange column (IF2). IFI has been identified as a cysteine-rich para-albumin and IF2 as an histidine-rich immunoglobulin-like protein. (Auth.)

B-52217

Kompowski, A., **Growth of the antarctic fishes. A review,** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.255-263, Refs. p.258-260.

The objective of this paper is to examine the relationships among the particular growth parameters of the antarctic fish which would confirm the theory that groups of similar growth parameters are of similar biological character.

B-52218

Kosiorek, P., Van den Hoff, J., **Penguins restraint and stress level,** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.265-270, 14 refs.

During most research on penguins it is necessary to temporarily immobilize the birds at some time to weigh, mark, or attach instruments. Although many penguin species seem unconcerned about a human's presence, a single approaching person has been shown to increase the bird's heart rate, suggesting that the animal is aware and may be stressed. Corticosterone is one of the hormones regulating the stress reaction in birds, including stress caused by immobilization. As captured and bag-restrained Adélie penguins show a three-fold increase in heart rate, it is concluded that this is a very stressful immobilization technique. Restricting the stress reaction is particularly important during the breeding season to avoid nest desertion or loss of eggs and chicks. The object of this paper is to propose a less stressful hood method for restraining penguins.

B-52220

Opaliński, K.W., Maciejewska, K., **Food and feeding in *Euphausia superba:* individual variation,** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.293-298, 15 refs.

Taxonomic composition and size composition of food, determined from stomach contents of eight krill specimens caught in one haul in the Lazarev Sea on Jan. 26, 1990, are discussed and presented in tables.

B-52227

Zale, R., **Changes in size of the Hope Bay Adélie penguin rookery as inferred from Lake Boeckella sediment,** *Ecography,* Dec. 1994, 17(4), p.297-304, 55 refs.

Concentration of phosphorus and copper in the sediments of Lake Boeckella (Antarctic Peninsula) were used to provide an estimate of the size of the Adélie penguin rookery. Based on dated subsamples from a sediment core, it is concluded that penguins have been present in Hope Bay since 5550 BP, with the exception of a short period around 5300 BP. Their influence on the lake sediment reached a maximum at c. 40 BP and has drastically declined since then. The rookery started to grow between 850 and 1250 BP due to a climate deterioration. The increased amount of food (mainly krill) caused by extensive fur seal hunting in the 19th century was probably not enough to affect rookery growth. However, the drastic decline in whale stock in the 1930s and 1940s and the subsequent increase in krill abundance may have enhanced rookery growth. The increasing disturbance by man in Hope Bay seems only to have changed the shape of the rookery and the penguins' paths to the sea, but has not stopped the growth of the rookery. (Auth. mod.)

B-52234

Karentz, D., **Prevention of ultraviolet radiation damage in antarctic marine invertebrates,** NATO Advanced Research Workshop on Stratospheric Ozone Depletion/UV-B Radiation in the Biosphere, Gainesville, FL, June 14-18, 1993. Proceedings. Edited by R.H. Biggs et al and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.18, Berlin, Springer-Verlag, 1994, p.175-180, 37 refs.

DLC QC879.7.S88

One aspect of investigating the ecological effects of ozone depletion on marine communities is to identify species-specific characteristics relative to strategies for dealing with prevention and repair of UV-B (280-320 nm) damage. In adult marine invertebrates, protection from UV-B exposure can be provided by external coverings, by the presence of UV-absorbing molecules, or by both in cells and tissues. Using biological dosimetry, penetration of UV-B wavelengths through the exteriors of adult invertebrate has been observed. In addition, selective partitioning of UV-absorbing compounds occurs in adult invertebrate tissues. The highest concentrations of these substances are found in ovaries and eggs. Planktonic larval stages receive higher UV exposures then benthic adults and have considerably less optical shielding. Since egg cells tend to have higher concentrations of UV-absorbing compounds than other body tissues, this may provide for increased protection of embryos and larvae during planktonic development. (Auth. mod.)

B-52235

Prézelin, B.B., Boucher, N.P., Schofield, O., **Evaluation of field studies of UVB radiation effects on antarctic marine primary productivity,** NATO Advanced Research Workshop on Stratospheric Ozone Depletion/UV-B Radiation in the Biosphere, Gainesville, FL, June 14-18, 1993. Proceedings. Edited by R.H. Biggs et al and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.18, Berlin, Springer-Verlag, 1994, p.181-194, 14 refs.

DLC QC879.7.S88

Phytoplankton productivity can account for half the global production of organic carbon each year. Serious concerns exist that global thinning of atmospheric ozone (O_3) and associated enhancement of UV-B radiation may impair phytoplankton primary productivity. Thus it is essential to quantify O_3-related effects on primary production and elucidate regulating mechanisms underlying any impairment of phytoplankton biology by UV-B under natural conditions. Field studies conducted under the influence of the severe antarctic O_3 hole can provide the sensitivity required to quantify O_3-dependent impacts on marine primary production. Given the further reduction in global stratospheric O_3 expected to occur at all latitudes over the next century, the findings of these field studies may also be relevant outside the polar regions.

B-52237

Jung, A., Johnson, P., Eastman, J.T., DeVries, A.L., **Protein content and freezing avoidance properties of the subdermal extracellular matrix and serum of the antarctic snailfish, *Paraliparis devriesi*,** *Fish physiology and biochemistry,* 1995, 14(1), p.71-80, Refs. p.79-80.

The antarctic snailfish *Paraliparis devriesi* (Liparididae) occupies an epibenthic habitat at a depth of 500-650 m in the subzero waters of McMurdo Sound. This species has watery (97%) gelatinous subdermal extracellular matrix (SECM) comprising a mean of 33.8% of the body weight, the largest known proportion of any adult fish. The protein concentration of the SECM was found to be 6-7 mg/ml (0.6-0.7% w/v). Partial N-terminal amino acid sequence data were obtained for 4 of the major SECM polypeptides. The N-terminal amino acid sequences of 3 of these were not identical to or homologous with any other known sequences, whereas the N-terminal sequence of one polypeptide (M_r 51,000) was identical to partial sequence from the apolipoprotein A-I precursor of Atlantic salmon *(Salmo salar).* Although not isolated from either SECM or serum, melting point-freezing point behavior of body fluids suggest that *Paraliparis* possess modest amounts of a noncolligative antifreeze compound. Since relatively small amounts of antifreeze are present in the serum and even less in the SECM, freezing avoidance results from the combined effects of antifreeze and the elevated osmolality of body fluids. There are no special adaptations to prevent freezing in the superficially located high water content SECM. (Auth. mod.)

B-52246

Karentz, D., Gast, T., **Transmission of solar ultraviolet radiation through invertebrate exteriors,** *Antarctic journal of the United States,* 1993, 28(5), p.113-114, 5 refs.

Four species of antarctic invertebrates have been evaluated to determine the amount of UV protection provided by their external covering. These taxa are common in intertidal and subtidal regions of the Antarctic Peninsula. Animals were collected in Arthur Harbor and immediately dissected for use. The 4 species examined were the sea urchin *Sterechinus neumayeri,* the sea star *Odontaster validus,* the limpet *Nacella concinna,* and the tunicate *Cnemidocarpa verrucosa.* Both the sea urchin *S. neumayeri* and the sea star *O. validus* have a thin epidermal layer that is external to a calcareous skeleton and the body wall. The epidermal cells of these echinoderms have no protective covering to reduce UV exposure. The body of the limpet *N. concinna* is completely covered by a dorsal shell; the body of the tunicate *C. verrucosa* is enclosed by a thick outer layer of fibrous cellulosic material known as the tunic. The transmission of UV-B through the outer coverings of these invertebrate species is relatively low, generally less than 3% of incident radiation flux. However, the damage caused by prolonged exposures during 24-hour antarctic day lengths remains unknown.

B-52247

Anderson, S., Hoffman, J., Wild, G., Bosch, I., Karentz, D., **Cytogenetic, cellular, and developmental responses in antarctic sea urchins *(Sterechinus neumayeri)* following laboratory ultraviolet-B and ambient solar radiation exposure,** *Antarctic journal of the United States,* 1993, 28(5), p.115-116, 6 refs.

The authors developed an aquatic animal model that can be used to evaluate genotoxic, cellular, and development responses to UV-B exposure using embryos of the sea urchin *Sterechinus neumayeri.* Embryos were exposed either to ambient solar radiation or to UV-B lamps in the laboratory. All studies were performed at Palmer Station. Preliminary data from the laboratory study indicate that anaphase aberration frequencies in embryos increase in a dose-dependent manner in response to UV-B exposure, and in parallel, the mean number of cells per embryo decreases. The *in situ* experiments indicated that cytogenetic, cellular, and developmental responses are all observable in embryos exposed at relatively shallow depths under ambient light conditions. Embryos exposed at 1-m depths, both with and without mylar, exhibited 80 and 94% abortive mitoses, respectively; yet embryos exposed at 7-m depths exhibited a low incidence of abortive mitoses in both the UV-B transparent and mylar treatments (2 and 9%).

B-52248

Boucher, N.P., Prézelin, B.B., **Ozone-dependent ultraviolet effects vs. ultraviolet-B specific effects on primary productivity in the southern oceans: how and when to consider a spectral correction of direct field measurements,** *Antarctic journal of the United States,* 1993, 28(5), p.117-119, 8 refs.

In this article, the authors describe how a spectral weighting function for ultraviolet (UV) (A+B) inhibition of phytoplankton primary productivity might be applied as a spectral correction for direct measurements of UV-B inhibition in field incubators with imperfect UV-A optics.

B-52249

Howington, J.P., Kelly, B., Smith, J.J., McFeters, G.A., **Antibiotic resistance of intestinal bacteria from the indigenous fauna of McMurdo Sound, Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.119-120, 3 refs.

Based on the hypothesis that indigenous fauna in contact with the wastewater discharge at McMurdo Station are colonized by human intestinal microflora, intestinal bacteria in fecal samples were collected from the indigenous animal populations in McMurdo Sound and tested for antibiotic-resistance markers. Resistance bacteria were isolated from the sewage outfall in large numbers. Comparison of the antibiotic-resistant data collected from the animal populations present in McMurdo Sound to the resistance patterns of coliforms isolated from the outfall over three field seasons (1990, 1991, and 1992) indicate no colonization of indigenous fauna with human intestinal bacteria.

B-52250

Smith, J.J., McFeters, G.A., **Survival and recoverability of enteric bacteria exposed to the antarctic marine environment,** *Antarctic journal of the United States,* 1993, 28(5), p.120-123, 9 refs.

Release of untreated sewage into the marine environment from antarctic bases presents several unique conditions that may allow the entrained human enteric bacteria to persist for extended periods. The authors report physiological responses and recoverability of an enteric bacterial indicator and a pathogen following exposure to *in situ* marine conditions at McMurdo Station. Early stationary-phase cultures of *Escherichia coli* (EC) and *Salmonella typhimurium* (ST) were used. Results indicate that enteric bacteria in untreated sewage released into the antarctic marine environment from centers of human activity such as McMurdo Station and Amundsen-Scott Station persist in a physiologically active, yet nonrecoverable, state for extended periods.

B-52251

Smith, J.J., Howington, J.P., McFeters, G.A., **Plasmid maintenance and expression in *Escherichia coli* exposed to the antarctic marine environment,** *Antarctic journal of the United States,* 1993, 28(5), p.123-124, 7 refs.

Sewage discharged into the antarctic marine environment is expected to contain enteric bacteria harboring antibiotic resistance, as well as virulence-associated plasmids. Introduction of large numbers of plasmid-harboring human enteric bacteria from a point source increases the likelihood of horizontal transfer of these genes to naturally occurring bacterial populations. The autochthonous antarctic marine bacteria are known to harbor antibiotic resistance plasmids. An enterotoxigenic *Escherichia coli* strain harboring the high-copy number, ampicillin-resistance plasmid pUC19 (EC19) and a strain harboring the conjugative F-plasmid (EC-F, F-plasmid also encodes streptomycin and ampicillin resistance) were grown to early stationary phase, exposed *in situ,* and enumerated. Results indicate that antibiotic resistance and conjugative plasmids are maintained and expressed in *E. coli* exposed to the antarctic marine environment. In addition, low temperatures (-1.8°C) appeared to extend survival significantly as compared to temperate environments.

B-52252

Fritsen, C.H., Mordy, C.W., Sullivan, C.W., **Primary production in the Weddell Sea pack ice during the austral summer,** *Antarctic journal of the United States,* 1993, 28(5), p.124-126, 2 refs.

During the drift (Feb. to May 1992) of Ice Station Weddell 1 (ISW-1), time-series investigations of microbial communities were conducted within several types of antarctic pack ice during an austral autumn and winter. The results from these investigations are being analyzed to determine rates of primary production and nutrient dynamics within the sea ice and water column in the western Weddell Sea. Some results suggest that the perennial pack ice of the western Weddell Sea supports an autumn bloom that may be a significant source of new production within this ice-covered region.

B-52253

Garrison, D.L., Thomsen, H.A., ***Polarstern* "ANT X/3" austral autumn in the ice 1992: sea-ice community studies,** *Antarctic journal of the United States,* 1993, 28(5), p.126-128, 7 refs.

As part of the ANT X/3 research cruise aboard the icebreaker *Polarstern* (Mar. 27 to May 19, 1993), the authors examined the ecology of ice biota in the southeastern Weddell Sea during the autumn-to-winter transition. The studies focused on the following: incorporation, activity, and survival of organisms in newly formed and older sea ice; comparison of planktonic and ice assemblages; and systematic studies of some of the previously neglected and/or more unusual ice-associated flagellates. The findings suggest that algae survive and have photosynthetic activity within ice floes well into the austral autumn under natural conditions of low light, low temperatures, and high salinities.

B-52254

Smith, W.O., Jr., **Primary productivity of the Antarctic Peninsula region during November 1992,** *Antarctic journal of the United States,* 1993, 28(5), p.128-130, 5 refs.

During Nov. 1992, a cruise was conducted with the R/V *Polar Duke* (PD92-09) to the Antarctic Peninsula to investigate the coupling between phytoplankton and bacteria. The author also wanted to test the relationships between nitrate and ammonium as nitrogen sources for phytoplankton and bacteria. As part of these objectives, the author measured the biomass and productivity of the phytoplankton. Most of the samples from these experiments have yet to be analyzed, but this article presents the primary productivity and chlorophyll data from the stations sampled. Despite the region's potential for substantial productivity, the productivity and biomass observed were low. The onset of biomass accumulation and rapid growth probably occurs later in the season at the locations sampled. Productivity values like those found should be considered as prebloom rates and indicative of phytoplankton activity before the onset of 24-hour photoperiods and increased water-column stratification.

B-52255

DiTullio, G.R., Smith, W.O., Jr., **Dimethyl sulfide concentrations near the Antarctic Peninsula: November 1992,** *Antarctic journal of the United States,* 1993, 28(5), p.130-132, 10 refs.

Dimethyl sulfide (DMS) in Charlotte Bay and Paradise Harbor were found to be relatively low, and spatially variable; concentrations varied up to an order of magnitude from station to station. The authors attribute the patchiness in DMS concentrations to the presence of sea-ice algae. The spatial variability noted for both chlorophyll-*a* concentration and primary production rate supported this hypothesis. In general, particulate DMSP (dimethyl sulfoniopropionate) concentrations were highest in the surface waters. The inconsistent relationship among pigments, DMS, and $\mathrm{DMSP}_{\mathrm{part}}$ concentrations probably reflects the patchy distribution of ice algae in this environment. Phytoplankton biomass as estimated from chlorophyll-*a* concentrations was less than 250 nanograms per liter near the Antarctic Peninsula in early to mid-Nov. 1992. Phytoplankton species composition indicated the relative dominance of diatoms and prymnesiophytes, albeit at low concentrations. The concentration of hex (chemotaxonomic indicator for the presence of *Phaeocystis pouchetii)* could not explain the variability in DMS or $\mathrm{DMSP}_{\mathrm{part}}$ concentrations observed. The authors hypothesize that efficient grazing on the ice algae by krill was responsible for the observed variability and patchy distribution of DMS concentrations.

B-52256

Baker, B.J., Kopitzke, R.W., Hamann, M., McClintock, J.B., **Chemical ecology of antarctic marine invertebrates in McMurdo Sound, Antarctica: chemical aspects,** *Antarctic journal of the United States,* 1993, 28(5), p.132-133, 15 refs.

Based on results of work carried out during the 1992 field season, the authors investigated several sponges for the presence of bioactive substances and have found two new substances. Their role in the producing organism is addressed. The general picture that is forming of secondary metabolism in antarctic sponges suggests that these polar invertebrates are more similar than different, compared with their tropical and temperate counterparts. The first example of unusual chemistry appears to be the variolins from the antarctic red sponge *Kirkpatrickia variolosa.* This is only a small number of what must be many secondary metabolites produced by antarctic sponges; however, it seems unlikely that the chemistry of these organisms will prove to be qualitatively unique.

B-52257

McClintock, J.B., Slattery, M., Baker, B.J., Heine, J.N., **Chemical ecology of antarctic sponges from McMurdo Sound, Antarctica: ecological aspects,** *Antarctic journal of the United States,* 1993, 28(5), p.134-135, 18 refs.

Recent cytotoxicity and behavioral bioassays conducted with antarctic sponges and other sessile or sluggish antarctic marine invertebrates have detected an incidence of biochemical activity commensurate with temperate marine environments. The authors have undertaken to isolate and identify bioactive substances from antarctic marine invertebrates, and report here their work on antarctic sponges during the 1992 austral summer. In the investigation of chemical ecology of antarctic sponges, the authors have evaluated extracts from sponges for the presence of defensive substances, using a standard antimicrobial assay as well as an ecological assay. Although it remains to be determined whether secondary metabolites are responsible for all of the activity reported, bioactive secondary metabolites have already been isolated from a number of antarctic sponges.

B-52258

Slattery, M., Bosch, I., **Cost of brood maintenance and development in the seastar *Neosmilaster georgianus* from Anvers Island, Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.136-138, 11 refs.

The purpose of this study was to examine the costs of brooding and brood development in the seastar *Neosmilaster georgianus.* These large forcipulate asteroids are widespread in shallow subtidal communities of the Antarctic Peninsula. *N. georgianus* exhibits reproductive asynchrony within populations, an unusual pseudocopulatory spawning behavior, and extended periods of brood protection during which the female is unable to feed. Collections of *N. georgianus* were made during the 1991 field season at Palmer Station, from depths of 2-15 m. Results suggest that *N. georgianus* produces large eggs, in part to offset energetic demands of development. These early embryonic changes were coincident with the development of membranaceous tubules that effectively joined brood mates, forming clusters of up to 40 individuals. Histological evidence showing the movement of lipid and other material through these tubules suggest they are a means of "cannibalizing" broodmates for energy to fuel development.

B-52259

Kaufmann, R.S., Smith, K.L., Jr., Baldwin, R.J., Glatts, R.C., Robinson, B.H., Reisenbichler, K.R., **Epipelagic communities in the northwestern Weddell Sea: results from acoustic, trawl, and trapping surveys,** *Antarctic journal of the United States,* 1993, 28(5), p.138-141, 9 refs.

Two upward-looking split-beam acoustic arrays were deployed at each of two locations as part of a short-term feasibility study to evaluate the possibility of using free-vehicle (independent of a ship or any surface mooring) acoustic instruments to monitor the abundance, vertical distribution, and size distribution of animals in the upper 100 m of the water column beneath seasonal pack ice. Tests were done in the northwestern Weddell Sea during early Oct. 1992 in ice-covered water and in open water. Acoustic targets were more abundant at the open-water location than at the ice-covered site, yielding 10.0 and 7.6 targets per hour of sampling, respectively.

B-52260

Daly, K.L., DiTullio, G.R., **Biogenic production of dimethyl sulfide: krill grazing,** *Antarctic journal of the United States,* 1993, 28(5), p.141-142, 11 refs.

During austral spring the authors participated in a cruise to the Antarctic Peninsula on board the R/V *Polar Duke* during Nov. 1992. Sea ice covered much of the surface water in coastal embayments and primary production in the water column was very low. In Charlotte Bay and Paradise Harbor, juvenile krill were collected by an Isaacs-Kidd Midwater Trawl, primarily near the surface among ice floes where many individuals were observed feeding on the edge of floes. Based on the prevalence of sea-ice algae and krill populations near these ice floes, it is suggested that krill grazing on ice algae may play an important role in enhancing dimethyl sulfide production in antarctic coastal regions.

B-52261

Detrich, H.W., III, Parker, S.K., **Novel neural beta tubulin from the antarctic fish *Notothenia coriiceps neglecta*,** *Antarctic journal of the United States,* 1993, 28(5), p.143-145, 13 refs.

From the standpoint of cold adaptation, the ectothermic fishes of antarctic coastal waters, which can experience body temperatures as low as the freezing point of sea water (-1.86°C), present biochemists with ideal experimental systems. To understand the nature of these adaptations, the authors initiated efforts to determine the primary sequences (that is, the order of amino acid subunits) of the alpha and beta tubulins of antarctic fishes by molecular-biological methods. In this report they describe the sequence of a neural beta tubulin from the antarctic rockcod *Notothenia coriiceps neglecta.*

B-52262

Roby, D.D., Taylor, J.R.E., Place, A.R., **Physiological aspects of stomach-oil formation in antarctic seabirds,** *Antarctic journal of the United States,* 1993, 28(5), p.146-147, 4 refs.

During the 1991-92 austral summer the authors conducted fieldwork on Bird I. to investigate the role of stomach oils in digestive physiology, development, and reproductive energetics of seabirds. The subjects of this study were antarctic prions *(Pachyptila desolata),* a species that feeds its young stomach oils, and South Georgia diving petrels *(Pelecanoides georgicus),* a species that lacks stomach oils. Results indicate that prions are more energetically efficient at foraging for their young; diving petrels are less energetically efficient compared with other seabirds. The higher foraging efficiency of prions may be essential for the production of stomach oils and for the transfer of this energy-rich dietary component to their young. Stomach oils appear to be an important adaptation for enhancing the energy density of chick meals in petrel species that forage farther from the colony and feed their chicks less frequently than diving petrels.

B-52263

Miller, G.D., Couch, L., Duszynski, D.W., **Preliminary survey for coccidian parasites in the birds at Cape Bird, Ross Island,** *Antarctic journal of the United States,* 1993, 28(5), p.148, 5 refs.

The purpose of this study was to determine the species distribution of coccidian parasites in Adélie penguins and south polar skuas. During the 1991-92 summer season the authors collected 26 fecal samples from south polar skuas (15 adults, 11 chicks) and 4 fecal samples from adult Adélie penguins at Cape Bird, Ross I. All the samples except one (taken from a breeding adult male skua) were negative for parasite stages in their feces. The one positive sample had a heavy infection with coccidia, as evidenced by tens of thousands of oocysts in the sample. Such a high density of oocysts indicates that the infection was not incidental. The coccidian that discharged these oocysts is probably a new species since the structure and size of the unsporulated oocysts do not match any coccidian oocysts from birds described in the literature.

B-52264

Kooyman, G.L., Horning, M., Ponganis, P.J., Kooyman, T., Kooyman, C., Cherel, Y., **Emperor penguin foraging behavior in the western Ross Sea, 1992,** *Antarctic journal of the United States,* 1993, 28(5), p.149, 2 refs.

Studies were done at Cape Washington and Coulman I. to compare the foraging traits between the two colonies, to determine the distribution of foraging birds from four colonies (Cape Washington, Coulman I., Cape Roget, and Cape Crozier) in the Ross Sea, and to census all colonies. Foraging and distribution data were obtained with time-depth and satellite transmitters attached to the birds. Detailed analyses of the data are not complete, but some of the salient features are discussed.

B-52265

Janes, D.N., Shoemaker, V.H., Chappell, M.A., Peterson, C.J., **Reproductive effort and foraging energetics in Adélie penguins,** *Antarctic journal of the United States,* 1993, 28(5), p.150-151, 2 refs.

This study of the physiology and behavior of Adélie penguins at a rookery near Palmer Station concerns reproductive effort in males and females in a species with a monogamous breeding system and extensive parental care by both sexes. The authors are using a combination of field and laboratory techniques to measure input and output of energy, salts, and water in Adélie penguin chicks; they also measured the energy, salt, and water contents of the regurgitated food. The hypothesis is made that the relatively lower water intake of large chicks creates a higher demand for use of the salt glands to excrete a salt load. The salt glands can excrete large amounts of salt with very little concomitant water loss. Small chicks are less water limited and use their kidneys to excrete more of the salt load than do larger chicks.

B-52266

McCormick, D.F., Emslie, S.D., Karnovsky, N.J., Keith, L.W., Trivelpiece, S.G., Trivelpiece, W.Z., **Continuing studies of the demography and foraging behavior of the *Pygoscelis* penguins,** *Antarctic journal of the United States,* 1993, 28(5), p.151-152, 2 refs.

The research reported consisted of three interrelated projects: the continuation of the previous years' demographic study on the Adélie, gentoo, and chinstrap penguin populations; a study of Adélie foraging behavior; and a study examining penguin band loss using implanted transponders. It was carried out at Copacabana Field Station in Admiralty Bay from mid-Oct. 1992 to the end of Feb. 1993.

B-52267

Hurford, W.E., et al, **Splenic contraction, blood volume, and muscle saturation of free-diving Weddell seals,** *Antarctic journal of the United States,* 1993, 28(5), p.152-155, 11 refs.

Because a seal's lungs collapse during diving, oxygen storage during diving is limited to that stored in the blood and myoglobin. The authors sought to explore the behavior of these oxygen stores during diving. Weddell seals increase their circulating hemoglobin concentration by 60% during the first 10-12 min of a dive. The authors hypothesize that the spleen of the Weddell seal would contract, similar to the contraction observed in exercising thoroughbreds, and inject erythrocytes into the peripheral circulation during diving. Because Weddell seals have a very large spleen, approximately two-thirds of the seal's erythrocytes might be sequestered in the spleen at rest. To test this hypothesis, splenic dimensions were measured by ultrasound during recovery from diving and correlated with changes of venous hemoglobin concentration and hematocrit. Results are discussed and data are presented in graphs.

B-52268

Testa, J.W., Castellini, M.A., Rea, L.D., **Physiological and behavioral ecology of juvenile Weddell seals,** *Antarctic journal of the United States,* 1993, 28(5), p.155-156, 7 refs.

This project attempts to integrate information on the physiological and behavioral development of juvenile Weddell seals in relation to their ecology and survival. It was motivated in part by the need for comparative studies with similar work being conducted on Northern Hemisphere pinnipeds that are showing significant population declines.

B-52269

Ray, M.K., Kumar, G.S., Shivaji, S., **Phosphorylation of lipopolysaccharides in the antarctic psychrotroph *Pseudomonas syringae*: a possible role in temperature adaptation,** *Journal of bacteriology,* July 1994, 176(14), p.4243-4249, Refs. p.4248-4249.

Phosphorylation of lipopolysaccharide (LPS) from a psychrotrophic bacterium, *Pseudomonas syringae* from Antarctica was studied by using sucrose gradient-separated membrane fractions. The bacterium was found to possess an LPS kinase which could phosphorylate more LPS postsynthetically at higher temperatures. The phosphorylation was low at a lower temperature and was also found to occur in vivo. After phosphorylation of LPS in vitro, it was found that the major part of the radioactivity (>85%) was associated with the core oligosaccharide region of the LPS. The phosphate groups of this region are probably involved in the binding of metal ions, which could be removed by EDTA. The cells grown at the lower temperature probably contained fewer divalent cations because of the smaller amount of phosphate and thereby were more sensitive to EDTA. The cells are also more sensitive to cationic antibiotics at the lower temperature.

B-52270

Davail, S., Feller, G., Narinx, E., Gerday, C., **Cold adaptation of proteins: purification, characterization, and sequence of the heat-labile subtilisin from the antarctic psychrophile *Bacillus* TA41,** *Journal of biological chemistry,* July 1, 1994, 269(26), p.17448-17453, 31 refs.

The authors report the characterization of subtilisin S41, an alkaline protease secreted by the antarctic psychrophile *Bacillus* TA41. It is proposed that the psychrophilic enzyme possesses a more flexible molecular structure than mesophilic and thermophilic subtilases in order to compensate for the reduction of reaction rates at low temperatures. The model of subtilisin S41 indeed reveals several features able to induce a more flexible, heat-labile conformation: the occurrence of 4 extended surface loops, a very hydrophilic surface through 11 extra Asp residues, and the lack of several salt bridges and aromatic-aromatic interactions. The low affinity of the Ca1 calcium binding site, resulting possibly from one chelating side chain substitution and the stacking of Gly residues, also reflects a less compact conformation. The difference of free energy of stabilization between subtilisin S41 and a mesophilic subtilisin suggests that the balance of exo- and endothermically formed weak bonds is critical for enzyme flexibility. (Auth. mod.)

B-52271

Chown, S.L., Kuschel, G., **New *Bothrometopus* species from Possession Island, Crozet Archipelago, with nomenclatural amendments and a key to its weevil fauna (Coleoptera: Curculionidae: Brachycerinae),** *African entomology,* Sep. 1994, 2(2), p.149-154, 22 refs.

Three new species of Curculionidae are described from Possession I. and a key to the weevil fauna of the island is provided. The following nomenclatural changes are made, based on an examination of all 36 species in the *Ectemnorhinus*-group of genera: *Neocanonopsis* Hoffmann is synonymized with *Christensenia* Brinck, *Antarctonesiotes* Jeannel and *Mesembriorrhinus* Jeannel with *Bothrometopus* Jeannel, and *Dusmoecetes* Jeannel and *Xanium* Enderlein with *Ectemnorhinus* G.R. Waterhouse. *Christensenia dreuxi* (Hoffmann) comb. n. is transferred from *Neocanonopsis, Bothrometopus crozetensis* (Enderlein) comb. n. is transferred from *Mesembriorrhinus* and reinstated as a valid species, *Bothrometopus desolationis* (Jeannel) comb. n. is transferred from *Antarctonesiotes, Ectemnorhinus vanhoeffenianus* (Enderlein) comb. n. is transferred from *Xanium,* and *Ectemnorhinus possessionensis* (Hoffmann) comb. n. is transferred from *Xanium* and removed from synonymy with *E. vanhoeffenianus.* The rich diversity of species on Possession I. is briefly compared with that of the other south Indian Ocean islands. (Auth.)

B-52272

Chown, S.L., Language, K., **Recently established Diptera and Lepidoptera on sub-Antarctic Marion Island,** *African entomology,* Mar. 1994, 2(1), p.57-60, 20 refs.

The authors report the colonization and establishment of a fly species new to the Crozet Is. and an increase in the frequency of occurrence of previously 'rare transient alien' insects. They comment on the relevance of these findings to suggestions that an increase in temperature and growing season warmth could improve the chances of successful colonization of these islands, particularly by invertebrates either introduced by man or that are capable of long-distance dispersal. Voucher specimens of insects collected during this study are deposited in the Transvaal Museum, Pretoria (Lepidoptera), and National Collection of Insects, Pretoria (Diptera).

B-52273

Chen, H.W., Song, Q.Y., **Microbes in the area of the South Shetland Islands,** *Antarctic research,* Dec. 1994, 5(2), p.1-8, 5 refs.

From the air over the South Shetland Is. and Maxwell Bay, the detection rate of terrigenous microbes was more than 90% and their amount was generally a few CFU/m^3. Air temperature and relative humidity were factors affecting quantitative variations of the microbes. The bacterial amount of the surface sea water in the Great Wall Bay was from 0 to 100 CFU/cm^3; the amount of microbes decreased with the monthly drop in seawater temperature and showed a state of diurnal variations. The microbial community consisted of at least 13 genera of which *Pseudomonas* were dominant. In the intertidal zone of Deception I., there were only a few CFU of bacteria per cubic meter of seawater. (Auth. mod.)

B-52274

Huang, F.P., Wu, B.L., **Species composition and quantitative variation of zooplankton in the Great Wall Bay and its adjacent waters, Antarctica,** *Antarctic research,* Dec. 1994, 5(2), p.9-17, 20 refs.

A preliminary identification has been made of 35 species of zooplankton in the Great Wall Station area and adjacent waters. The dominant species in the investigated area are *Calanus propinquus, Calanoides acutus, Metridia gerlachei* and krill larvae. The total biomass and number of individuals of zooplankton in the investigated waters showed obvious seasonal variation. In summer, there were *C. acutus* and the larvae of antarctic krill; in winter there were *M. gerlachei, C. propinquus, Oithona similis, O. frigida* and krill larvae. (Auth. mod.)

B-52275

Li, B.H., Huang, F.P., Zhang, K.C., **Preliminary analysis of the pigments from ice algae in the adjacent waters of Great Wall Station, Antarctica,** *Antarctic research,* Dec. 1994, 5(2), p.18-25, 14 refs.

This paper reports the results of separation and identification of the pigments from ice algae in waters adjacent to Great Wall Station from June to Dec. 1988. The composition and seasonal variations of the pigments of ice algae in the area, as well as their roles in marine ecosystems, are discussed. The results indicate that 15 kinds of pigments have been separated from ice algae, of which 13 can be identified: carotene, pheophytin-a, chlorophyll-a, -b, -c, xanthophyll, fucoxanthin, chlorophyllidae-a, violaxanthin, pheophorbide-a, chlorophyllin-a, derivative of chlorophyll-c (diadinoxanthin); two kinds of pigments could not be identified. There are distinct seasonal variations in the pigments. (Auth. mod.)

B-52276

Yu, J.L., Li, R.X., Huang, F.P., **Preliminary study of the phytoplankton ecology in the Great Wall Bay, Antarctica,** *Antarctic research,* Dec. 1994, 5(2), p.26-32, 12 refs.

This paper presents the identification and quantitative analysis of phytoplankton samples collected in Great Wall Bay from Mar. 1988 to Feb. 1989. The specific composition of phytoplankton samples clearly shows their ecological characteristics. This is a community mainly composed of cold-water species and neritic-eurythermal species. The dominant species showed seasonal variation, their number showing a high peak in the austral summer and an abundance of phytoplankton in each month. The distribution of phytoplankton is influenced by many environmental factors; of these, the hours of sunshine is the main factor. (Auth.)

B-52277

Zhu, G.H., Liu, Z.L., Ning, X.R., Wang, M., **Distribution characteristics of planktonic nano- and microalgae in the Prydz Bay and its adjacent southern Indian Ocean, during austral summer,** *Antarctic research,* Dec. 1994, 5(2), p.33-44, 7 refs.

Nano- and microalgae samples were collected from 34 stations in Prydz Bay and the Indian Ocean from Dec. 1990 to Jan. 1991. One hundred twenty-two taxa belonging to 40 genera and 5 phyla were identified. Among them, diatoms occupy 73%, dinoflagellates 20.5% and other species 6.5%. The average cell abundance of planktonic nano- and microalgae from net sample was 811.62 x 10^4 cells/m^3. For vertical distribution of planktonic nano- and microalgae, the maximum value was usually found at the surface and above 50 m depth, and gradually decreased with depth from 100 to 200 m. The relationship between planktonic nano- and microalgal abundance and krill density and nutrient (nitrate, phosphate and silicate) contents was negative. (Auth. mod.)

B-52288

Xiao, C.S., Liu, D.L., Zhou, P.J., **Survey of total number of bacteria and fungi isolated from the Fildes Peninsula in Antarctica,** *Antarctic research (Chinese edition),* Dec. 1994, 6(4), p.67-72, In Chinese with English summary. 18 refs.

Determination of total number and distribution of microbes was conducted on Fildes Peninsula and in the vicinity of the Great Wall Station, covering a total of 35 sampling sites and including mostly soil samples. The following results were obtained: total number of bacteria counts per gram of soil was 10^3-10^6 at 30°C, and 10^4-10^6 at 16°C, 4°C; and total number of fungi counts per gram of soil was 10^2-10^3 at 30°C, 16°C and 10^3 at 4°C. All of the bacteria are identified as 7 genera: *Micrococcus, Staphylococcus, Pseudomonas Bacillus, Alcaligenes, Flavobacterium,* and *Arthrobacter.* All of the fungi belong to 5 genera: *Penicillium, Cladosporium, Chrysosporium, Aspergillus,* and *Eurotium.* Total number of bacteria and fungi was greater at 4°C than at 30°C, and their density was greatest in the coastal region. Psychrophilic microbes on Fildes Peninsula include *Pseudomonas* (69%), *Bacillus* (54%), *Penicillium* (46%) and *Aspergillus* (17%).

B-52289

De Baar, H.J.W., et al, **Importance of iron for plankton blooms and carbon dioxide drawdown in the southern ocean,** *Nature,* Feb. 2, 1995, 373(6513), p.412-415, 41 refs.

The iron hypothesis is tested by looking at natural levels of productivity in regions of the southern ocean with differing iron abundance. In the southerly branch of the antarctic circumpolar current (ACC), upwelling of deep waters supplies sufficient iron to the surface to sustain moderate primary production but not to permit blooms to develop. In contrast, within the fast-flowing, iron-rich jet of the polar front (PF), spring blooms produce phytoplankton biomass an order of magnitude greater than that in southern ACC waters, leading to CO_2 undersaturation. The plankton-rich PF waters are sharply delineated from adjacent iron-poor waters, indicating that iron availability is the critical factor in allowing blooms to occur. (Auth. mod.)

B-52301

Fahl, K., **Biochemical investigations on the lipid metabolism of antarctic copepods** [Biochemische Untersuchungen zum Lipidstoffwechsel antarktischer Copepoden], *Berichte zur Polarforschung,* 1995, No.157, 135p., In German with English summary. Refs. p.109-119.

The winter and summer physiological exchange of lipids is investigated in the endemic species of antarctic copepod *Calanoides acutus, Calanus propinquus, Metridia gerlachai, Rhinacalanus gigas,* and *Euchaeta antarctica.* Results have shown that lipids play a central role in the antarctic ecological system. Due to different end products of the lipid biosynthesis, these organisms depend upon feeding habits and overwintering strategies to compensate for the pronounced seasonality in the Antarctic. Copepods build up large reserves of lipids, which form a long-lasting energy reservoir and which are at the disposal of other organisms in the pelagic system. They exert an influence on the processes in their living environment in two ways: they control the primary production, which chiefly comprises the herbivorous copepods, and provide energy-rich nourishment to higher members of the food chain. For the copepods that are dependent upon phytoplankton for their nourishment, definitive trophic relationships are developed. These organisms may be classified into three hydrographic regions characterized by their particular physical and chemical parameters, or equally by their phytoplankton distributions. (Auth. mod.)

B-52307

Beyens, L., Chardez, D., De Baere, D., Verbruggen, C., **Aquatic testate amoebae fauna of the Strømness Bay area, South Georgia,** *Antarctic science,* Mar. 1995, 7(1), p.3-8, 20 refs.

Forty-six taxa of testate amoebae were found in 45 samples of aquatic environments ranging from small pools to lakes. Four assemblages were distinguished which, to some degree, can be related ecologically to different pH ranges and to differences in the habitat structure. The *Nebela collaris* assemblage occurs in acid pools mostly vegetated with mosses. The *Centropyxis gibba gibbosa-Euglypha tuberculata-Difflugia globularis/globulus* assemblage is found in the sediments of circumneutral to slightly alkaline lakes. Both of the other assemblages are mainly found in pools, which are more (for the *Trinema* assemblage) or less vegetated with mosses, in slightly acid or circumneutral to slightly alkaline conditions. A generic comparison with arctic fauna indicates differences, especially in the role of *Difflugia* as a dominant genus in aquatic habitats. (Auth.)

B-52309

Cooper, J., Klages, N.T.W., **Diets and dietary segregation of sooty albatrosses *(Phoebetria* spp.) at subantarctic Marion Island,** *Antarctic science,* Mar. 1995, 7(1), p.15-23, 34 refs.

Subantarctic Marion I. is one of the few localities where the congeneric albatrosses *Phoebetria fusca* and *P. palpebrata* breed sympatrically. Chicks of both species at Marion I. were induced to regurgitate their stomach contents after being fed. Liquid formed over half the diet by mass. Cephalopods occurred most frequently in both species' diets. In terms of mass, cephalopods formed the larger part of the diet of sooty albatrosses, whereas fish was more important to light-mantled sooty albatrosses. Crustaceans and birds were also recorded for both species. Squid of the families Onychoteuthidae, Histioteuthidae, Chiroteuthidae and Cranchiidae occurred most abundantly in both species. Most squid taken by both albatrosses were of species known to float after death, suggesting that scavenging plays an important role in the species' foraging behavior. Light-mantled sooty albatrosses consumed more squid restricted to the south of the Antarctic Polar Front than did sooty albatrosses, supporting a trend to latitudinal segregation of the two species while foraging. (Auth.)

B-52310
Nicol, S., De la Mare, W.K., Stolp, M., **Energetic cost of egg production in antarctic krill *(Euphausia superba* Dana),** *Antarctic science,* Mar. 1995, 7(1), p.25-30, 27 refs.

A female antarctic krill loses 34% of its body mass when it lays a batch of eggs. This represents a considerable input of energy, which has been estimated using a combination of measured mass and energy differences in female krill and from the measured energetic content of ovarian tissue. Large (c. 50 mm) female krill lose 2.9-3.8 kJ each time a batch of eggs is laid. Calculations using this figure indicate that multiple spawning by antarctic krill in a season would require above average phytoplankton concentrations (>0.5µg chl *a*/l) and filtration rates which are close to the maximum reported (>10 l/h). (Auth.)

B-52311
Focardi, S., Bargagli, R., Corsolini, S., **Isomer-specific analysis and toxic potential evaluation of polychlorinated biphenyls in antarctic fish, seabirds and Weddell seals from Terra Nova Bay (Ross Sea),** *Antarctic science,* Mar. 1995, 7(1), p.31-35, 19 refs.

To provide data on the degree of contamination of the marine ecosystem, isomer-specific concentrations of polychlorinated biphenyls, including planar, mono- and di-*ortho* congeners, were measured in the Weddell seal, the Adélie penguin, the south polar skua, and in two species of antarctic fish *(Trematomus bernacchii* and *Chionodraco hamatus)* from Terra Nova Bay. The results show a clear relation between PCB concentrations and trophic level, in the order fish<Adélie penguin<Weddell seal. The higher values found in the skua appear to be related to its migration to more contaminated lower latitudes. The data for the various PCB congeners were used to calculate toxic potential in the different animals. The 2,3,7,8-TCDD toxic equivalents of coplanar congeners were estimated by the "toxic equivalent factors" (TEFs) approach. The highest values of TEFs were found in the south polar skua and Weddell seal. Values in the other species were considerably lower. (Auth.)

B-52312
Vacchi, M., La Mesa, M., **Diet of the antarctic fish *Trematomus newnesi* Boulenger, 1902 (Nototheniidae) from Terra Nova Bay, Ross Sea,** *Antarctic science,* Mar. 1995, 7(1), p.37-38, 18 refs.

A coastal ichthyological survey was carried out in Terra Nova Bay during the Italian Antarctic Expedition of 1987-88. This paper reports the stomach contents of *T. newnesi. Euphausia crystallorophias,* which is the most common euphausiid in the permanent ice zone of the Antarctic, ranked first among the crustacean prey. Prey of some importance (at least numerically) were amphipods. Hyperiid amphipods *Hyperiella dilatata* and *Hyperiella macronix* occurred most frequently, followed in decreasing order by *Cheirimedon fougneri* and *Eusirus antarcticus.*

B-52331
Sugawara, H., Ohyama, Y., Higashi, S., **Distribution and temperature tolerance of the antarctic free-living mite *Antarcticola meyeri* (Acari, Cryptostigmata),** *Polar biology,* Jan. 1995, 15(1), p.1-8, Refs. p.7-8.

The ecology and physiology of the free-living mite species *Antarcticola meyeri,* Cryptostigmata, rarely found in the continental antarctic zone, were studied near Showa Station. The distribution of this mite species correlated noticeably with the distribution of its food, the imperfect lichen species, which grow in moss carpets. Within a limited habitat, this mite species preferred dry carpets to wet carpets. Low humidity appeared disadvantageous to the species at high temperatures (ca. 30°C), but at low temperatures (ca. -25°C), low humidity appeared advantageous. This may explain why this species preferred dry carpets. The mean supercooling point of starved individuals was -30.6°C (nymphs) to -33.9°C (eggs). When fed with lichens, however, it was significantly raised, probably because the gut contents functioned as ice nucleators or contained ice-nucleating agents. Acclimatization to low temperatures significantly lowered the supercooling point in larvae but not in other growth stages. (Auth.)

B-52332
Mura, M.P., Satta, M.P., Agustí, S., **Water-mass influences on summer antarctic phytoplankton biomass and community structure,** *Polar biology,* Jan. 1995, 15(1), p.15-20, 32 refs.

The associations between the variability of phytoplankton biomass and community structure with the distribution of water masses around the Antarctic Peninsula were examined during austral summer 1993. Phytoplankton biomass showed high variability, and was dominated by an autotrophic flagellate *(Cryptomonas* sp.) that represented, on average, 91% of total phytoplankton biomass. The lowest phytoplankton biomasses were associated with the strongly mixed, saline cold waters characteristic of the Weddell Sea, and with the waters influenced by ice melt from the Bellingshausen Sea. The highest biomasses were found in the confluence of these water masses, where a front develops. Community composition also differed among water masses, with eukariotic picoplankton and diatoms having their highest relative contribution to community biomass in stations with Bellingshausen Sea and Weddell Sea water masses, whereas the abundance of *Cryptomonas* sp. was highest at the confluence of these waters. (Auth. mod.)

B-52333
Lopez, M.D.G., Huntley, M.E., **Feeding and diel vertical migration cycles of *Metridia gerlachei* (Giesbrecht) in coastal waters of the Antarctic Peninsula,** *Polar biology,* Jan. 1995, 15(1), p.21-30, Refs. p.29-30.

Diel vertical migration and feeding cycles of adult female *Metridia gerlachei* in the upper 290 m of a 335 m water column were measured during a total of 65 h in two periods of early summer (Dec. 20-21 and Dec. 25-26, 1991). Most of the copepod population was concentrated in a 50 m depth interval at all times. Feeding began simultaneously with nocturnal ascent from a depth of 200-250 m at approx. 18:00 h (local time), when the relative change in ambient light intensity was greatest. Ingestion rate increased exponentially at double the gut evacuation rate as the population moved upward through increasing concentrations of particulate chlorophyll-*a*. Although the bulk of the population did not move to depths shallower than 50 m, and began its downward migration at a rate of 20.8-31.7 m/h in complete darkness, individual females continued to make brief excursions into chlorophyll-rich surface waters during the first few hours of population descent. (Auth. mod.)

B-52334
Nishikawa, J., Naganobu, M., Ichii, T., Ishii, H., Terazaki, M., Kawaguchi, K., **Distribution of salps near the South Shetland Islands during austral summer, 1990-1991 with special reference to krill distribution,** *Polar biology,* Jan. 1995, 15(1), p.31-39, Refs. p.38-39.

Distribution and biomass of salps and krill *(Euphausia superba)* were investigated near the South Shetland Is. during austral summer 1990-91. Salp biomass ranged between 0 and 556 mgC/m^3 and was greatest at a station in the Bransfield Strait in late Dec. 1990. Salp biomass was lower than that of krill. Two species of salps, *Salpa thompsoni* and *Ihlea racovitzai* were found, with the former dominant numerically. Spatial distribution and generation composition of these two species were different. Spatial distributions of salps and krill did not overlap in the Jan.-Feb. period. While krill was found mainly in the coastal area, which showed high chlorophyll-*a* values, salps exhibited high biomass in the oceanic area with low chlorophyll *a* concentrations. Predation by salps on small krill is discussed as a potential reason for the relatively low abundance of krill at the stations where salps were present in great numbers. (Auth.)

B-52335
Marshall, D.J., Newton, I.P., Crafford, J.E., **Habitat temperature and potential locomotor activity of the continental antarctic mite, *Maudheimia petronia* Wallwork (Acari: Oribatei),** *Polar biology,* Jan. 1995, 15(1), p.41-46, 38 refs.

Microhabitat recordings suggest that the continental antarctic mite *Maudheimia petronia* Wallwork experiences temperatures above 0°C for 60% of the time during summer (about 2 months). Because the locomotor activity of this mite is suppressed at freezing temperatures, the time available for activity, and probably also feeding, is restricted. Temperature relations of potential locomotor activity rate suggest alleviation of this time constraint through the maximization of the rate. The locomotor activity rate of *M. petronia* is positively sensitive to the entire range of above-zero temperatures that it naturally experiences, being particularly accelerated at lower temperatures. Also, comparisons between mites acclimated at -15°C and 10°C suggest an inverse temperature acclimatization of this rate. The authors hypothesize that potential feeding rate is similarly related to temperature. (Auth. mod.)

B-52336

Marshall, D.J., Chown, S.L., **Temperature effects on locomotor activity rates of subantarctic oribatid mites,** *Polar biology,* Jan. 1995, 15(1), p.47-49, 21 refs.

The influence of temperature on locomotor activity was determined for two subantarctic mites, *Halozetes fulvus* Engelbrecht and *Podacarus auberti* Grandjean. In both species walking was severely impaired at below-freezing temperatures. Above zero, locomotor activity rates increased with a rise in temperature over a wide temperature range (for example, this was 2-30°C for *H. fulvus),* and they showed a biologically normal level of sensitivity to change in temperature. The present data are compared with some rate functions of maritime and continental antarctic micro-arthropods, and they confirm the relative enhancement of the physiological rate by a continental antarctic mite. One explanation for the less temperature-sensitive rates in *H. fulvus* and *P. auberti* may be that they have relatively more time available for normal biological activity. (Auth.)

B-52337

Sohlenius, B., Boström, S., Hirschfelder, A., **Nematodes, rotifers and tardigrades from nunataks in Dronning Maud Land, East Antarctica,** *Polar biology,* Jan. 1995, 15(1), p.51-56, 15 refs.

Four species of nematodes, 16 species of rotifers and 7 species of tardigrades were found in samples from nunataks in Kraul Mountains and Heimefrontfjella in Queen Maud Land, East Antarctica. The distribution of the fauna was very aggregated and some samples contained no animals. The degree of similarity in species composition between various nunataks was low. The highest abundances and number of species were found on the largest and highest nunataks in the most southern location. (Auth.)

B-52338

Nedwell, D.B., Walker, T.R., **Sediment-water fluxes of nutrients in an antarctic coastal environment: influence of bioturbation,** *Polar biology,* Jan. 1995, 15(1), p.57-64, Refs. p.63-64.

Rates of exchanges of nitrate and ammonium across the sediment-water interface were measured in an inshore marine environment at Signy I. over 6 months, from Aug. 1991 to Feb. 1992. The sediment was a source of ammonium to the water column but a sink for nitrate, although nitrate exchange rates were highly variable. Concentration profiles of nitrate and ammonium in the sediment porewater corroborated the measured vertical exchanges. Bioturbation, by a largely amphipod benthic infauna which was confined to the top 2 cm of sediment, was investigated experimentally. Removal of bioturbation depressed sedimentary O_2 uptake by 33% and sedimentary release of NH_4^+ by 50%. In contrast, in the absence of bioturbation, the removal of NO_3^- from the water column by the sediment increased in rate. (Auth. mod.)

B-52339

Andersen, R., Sæther, B.E., Pedersen, H.C., **Regulation of parental investment in the antarctic petrel *Thalassoica antarctica:* an exchange experiment,** *Polar biology,* Jan. 1995, 15(1), p.65-68, 22 refs.

An experiment was conducted on the antarctic petrel to test whether the parents were able to respond to changes in food demand of their offspring. Two experimental groups were formed by swapping eight 20-day old chicks with 10-day old chicks. The growth rate of 10-day old chicks in the nests of parents which initially had 20-day old chicks did not differ significantly from that in their respective control groups. This indicates that those parents were able to raise a new young nestling, despite having already raised another chick from hatching to 20 days. However, the 20-day old chicks placed in the nests of 10-day old chicks had a significantly lower growth rate than their control group. Feeding rate per day and nest did not differ significantly among the groups. This suggests that the observed difference in growth rate between 20-day old chicks is related to a lower amount of food delivered per visit. Thus, in the antarctic petrel the feeding rate apparently is not regulated by the status of the chick, but by the parents' ability to gather food or willingness to provide food for the chicks. (Auth.)

B-52340

Pakhomov, E.A., **Natural age-dependent mortality rates of antarctic krill *Euphausia superba* Dana in the Indian sector of the southern ocean,** *Polar biology,* Jan. 1995, 15(1), p.69-71, 15 refs.

Data on the size and age composition of antarctic krill were collected in the Cooperation and Cosmonaut Seas (Indian sector of the southern ocean) from 1985 to 1990. An estimation of the age-dependent annual extinction rate of krill was obtained using the Zikov and Slepokurov (1982) approach and results were fitted by a parabolic equation. The coefficients of instantaneous natural mortality (M) of krill derived with this approach range from 0.52 during the maturation period to 1.1-2.41 during the first and last years of life. (Auth.)

B-52341

Klages, M., Gutt, J., Starmans, A., Bruns, T., **Stone crabs close to the antarctic continent: *Lithodes murrayi* Henderson, 1888 (Crustacea; Decapoda; Anomura) off Peter I Island (68°51'S, 90°51'W),** *Polar biology,* Jan. 1995, 15(1), p.73-75, 9 refs.

Live reptant decapod crustaceans have never been collected on the antarctic continental shelf, although shrimps occur locally in large quantities. Therefore, the collection of four male individuals of the anomuran decapod *Lithodes murrayi* off Peter I Island, close to the antarctic continent, between 180 and 260 m water depth in Feb. 1994 is of particular relevance for further studies on the origin and adaptation of antarctic decapods. Another five specimens were observed *in situ* by a remotely operated vehicle at the same location. (Auth.)

B-52342

Wiencke, C., ed, Arntz, W.E., ed, **Benthos in polar waters** [Benthos in polaren Gewäßern], *Berichte zur Polarforschung,* 1995, No.155, Kolloquium im Rahmen des DFG-Schwerpunkt-programms "Antarktisforschung mit vergleichenden Untersuchungen in arktischen Eisgebieten," Bremerhaven, am 13. und 14. April 1994, 130p., In German. Literature compilation of Arctic and antarctic benthos, 1990-1994, p.107-130. Refs. passim.

On April 13-14, 1994 the colloquium "Benthos in polaren Gewäßern" was held at the Alfred Wegener Institute. It featured antarctic research with comparisons to research in arctic ice covered areas and included such topics as taxonomy, macroalgae, and terrestrial vegetation. Following summaries of the individual presentations there were plenary discussions on the goals and changes in benthic research expected during the next five years. The summaries are included in this volume. Among others, the colloquium sessions discussed activities and colonization potential of antarctic cryptogams; first results of long time measurements of maritime cryptogam sites; photosynthetic characteristics of antarctic macroalgae; sea anemones (Actiniaria) in the Arctic; and new ecological aspects (results of EPOS II).

B-52346

Smith, R.I.L., **New significance for antarctic plant collections and cryptogam taxonomy,** *NERC news,* Oct. 1993, No.27, p.27-29.

After discussing plant diversity in Antarctica and the importance of taxonomic research, the author describes the British Antarctic Survey's herbarium, which has become a valuable resource for researchers internationally. The primary use of the collections and the associated database has been for basic taxonomic studies needed in assessing the biodiversity of specific antarctic and subantarctic ecosystems. The value of cryptogams as research tools is discussed.

B-52351

Le Boeuf, B.J., ed, Laws, R.M., ed, [International Conference on Elephant Seals, Santa Cruz, CA, May 20-21, 1991], **Elephant seals: population ecology, behavior, and physiology,** Berkeley, University of California Press, 1994, 414p., Refs. passim. For selected papers see: B-52352 through B-52361.

DLC QL737.P64E44

In this volume, the first section on population ecology contains chapters addressing the history and current status of both northern and southern species, the impact of southern elephant seals on the antarctic ecosystem, and possible causes of the decline of some colonies. In the second section, the results of long-term studies of juvenile survivorship, diet, and breeding strategies of the northern elephant seal are presented, basic behavioral and life history data that are intended to elucidate the causes of population growth and decline. The third section deals with at-sea behavior of both species. Data and concepts presented in the various chapters include a light theory for determining migratory paths and foraging areas, new directions for clarifying foraging behavior and physiological constraints on diving, such as early development, measurement of swimming speed, and analysis of dive types. The volume closes with a consideration of key elements of foraging economics in southern elephant seals, endocrine changes during development, breath-hold performance during sleep on land and underwater, and the role of hormones in fuel regulation during fasting, a key aspect of the life history strategy of both species.

B-52352

Le Boeuf, B.J., Laws, R.M., **Elephant seals: an introduction to the genus,** Elephant seals: population ecology, behavior, and physiology. Edited by B.J. Le Boeuf and R.M. Laws, Berkeley, University of California Press, 1994, p.1-26, Refs. p.21-26.

DLC QL737.P64E44 1994

The two species of elephant seals, *M. angustirostris* and *M. leonina,* inhabit opposite hemispheres and contrasting climatic zones, they breed at different times of the year, and they differ in size and elaboration of male secondary sexual characteristics. The northern species is lacking in genetic variation, apparently the result of an extreme population bottleneck caused by sealing in the last century; the population has increased rapidly in this century. The southern species has decreased in overall number over the last half century. There are three or four stocks, with little genetic interchange; the major stock appears to be stable, others have decreased, and one population is increasing. Despite these differences and thousands of years of separation without intermingling, the two species are remarkably similar in morphology, behavior, and life history traits serving reproduction and diving patterns. (Auth.)

B-52353

Laws, R.M., **History and present status of southern elephant seal populations,** Elephant seals: population ecology, behavior, and physiology. Edited by B.J. Le Boeuf and R.M. Laws, Berkeley, University of California Press, 1994, p.49-65, 44 refs.

DLC QL737.P64E44 1994

The total world population of southern elephant seals in 1990 was estimated at 664,000. The species was hunted for its oil in the eighteenth and nineteenth centuries but subsequently recovered under protection. The history and rational basis for this industry is described, including some effects of sealing, population decline from 1931 to 1951, and subsequent recovery to sustained yield level under a research-based management plan. A comprehensive survey in the 1985 breeding season indicated the same annual pup production as for 1951 and a population of 357,000 in 1990. Population models indicate that some 75% of the adult male population is at sea during the breeding season, which has implications for aquatic mating of virgin females and nonpregnant mature females. A literature review of other stocks examines various estimates of pup production by site and years between 1949 and 1990 and converts these by a raising factor to estimates of total population sizes by years. (Auth. mod.)

B-52354

Hindell, M.A., Slip, D.J., Burton, H.R., **Possible causes of the decline of southern elephant seal populations in the southern Pacific and southern Indian Oceans,** Elephant seals: population ecology, behavior, and physiology. Edited by B.J. Le Boeuf and R.M. Laws, Berkeley, University of California Press, 1994, p.66-84, 50 refs.

DLC QL737.P64E44 1994

Several characteristics of declining southern elephant seal populations provide a basis for the formulation and testing of hypotheses designed to explain the decline. Some populations seem to be declining independently of other major southern ocean vertebrate consumers, but only two of the three distinct stocks have exhibited a decline. Studies conducted in the 1950s and 1960s indicate that elephant seals from Macquarie I. had lower survivorship and slower growth rates and reached sexual maturity later than those from South Georgia. Survival of first-year seals decreased dramatically during the 1960s and led to the near total failure of the 1965 cohort; the fate of later cohorts has not been determined. Two main hypotheses are advanced, one involving equilibration processes after intense sealing pressure and the other concerned with fluctuations in the ocean environment. However, while there may be a single driving factor influencing the populations of southern elephant seals in the Indian and Pacific Ocean sectors, there may be additional local factors that also regulate the populations. (Auth. mod.)

B-52355

Bester, M.N., Wilkinson, I.S., **Population ecology of southern elephant seals at Marion Island,** Elephant seals: population ecology, behavior, and physiology. Edited by B.J. Le Boeuf and R.M. Laws, Berkeley, University of California Press, 1994, p.85-97, 37 refs.

DLC QL737.P64E44 1994

Research has highlighted the continued decline in the southern elephant seal population at Marion I., and life table data implicate recently matured cows as the most vulnerable part of the population. Observation of onshore behavior suggests that the factors producing the elevated mortality rates of these cows operate at sea. Current research is concentrated on the investigation of at-sea behavior of this component of the population. (Auth.)

B-52356

Boyd, I.L., Arnbom, T.A., Fedak, M.A., **Biomass and energy consumption of the South Georgia population of southern elephant seals,** Elephant seals: population ecology, behavior, and physiology. Edited by B.J. Le Boeuf and R.M. Laws, Berkeley, University of California Press, 1994, p.98-117, 46 refs.

DLC QL737.P64E44 1994

The total annual energy expenditure was estimated for different age and sex classes of southern elephant seals breeding at South Georgia. The estimated energy costs of reproduction, growth, foraging, and molt were used to calculate an annual energy budget for individuals in each age and sex class. This was combined with population size and age structure to estimate population energy requirements. The estimated average metabolic cost of maintenance for adult males and females was 0.17 and 0.39 MJ/year, respectively. Male biomass accounted for 63% of the total population biomass (222,903 metric tonnes), and the metabolic power for the whole population averaged over one year was 190 MWatts. Total energy expenditure of each age class declined during the first two years, then began to increase because of the onset of reproduction in females and because of increased energy costs of foraging and growth in males. (Auth. mod.)

B-52357

Hill, R.D., **Theory of geolocation by light levels,** Elephant seals: population ecology, behavior, and physiology. Edited by B.J. Le Boeuf and R.M. Laws, Berkeley, University of California Press, 1994, p.227-236, 9 refs.

DLC QL737.P64E44 1994

A technique for determining the location of elephant seals is described. This technique requires an accurate determination of time of dawn and dusk on a daily basis. The time midway between dawn and dusk, the local apparent noon, determines the seal's longitude, and the day length is used to determine latitude. The longitude determination is equally accurate throughout the year and at all latitudes except those with no dawn and dusk events; the latitude determination is most accurate at the solstices but useless at the equinoxes. Other sources of error are the accuracy of the light-level measurements, atmospheric aberration, and seal behavior. The technique has application to both northern and southern elephant seals. (Auth. mod.)

B-52358

Slip, D.J., Hindell, M.A., Burton, H.R., **Diving behavior of southern elephant seals from Macquarie Island: an overview,** Elephant seals: population ecology, behavior, and physiology. Edited by B.J. Le Boeuf and R.M. Laws, Berkeley, University of California Press, 1994, p.253-270, 23 refs.

DLC QL737.P64E44 1994

Results from 84 deployments of time-depth recorders on southern elephant seals at Macquarie I. are discussed. Water temperature data, also collected by the diving instruments, indicated that the major foraging areas of adult elephant seals from Macquarie I. were located in antarctic waters and that males used areas over the antarctic continental shelf, while females tended to inhabit deeper offshore waters. Approximately 90% of the time at sea was spent submerged, with times on the surface generally less than 10 minutes. Five characteristic dive types were identified, the most common of which were type 1 and type 2 dives. Both types are characterized by rapid descent to a depth followed by a protracted time at that depth interspersed with a number of small "wiggles," in turn followed by a rapid ascent to the surface. Type 1 dives exhibited marked diurnal variation, while type 2 dives showed no such variation and were usually in long sequences of very similar depths. The majority of dives made by southern elephant seals are characteristically deep (maximum depth=1,430 m) and long (maximum duration=120 min.) Estimated aerobic dive limits (ADL) were rarely exceeded by males or postbreeding females, but 44% of all dives made by postmolt (and, therefore, gestating) females exceeded ADL. (Auth. mod.)

B-52359

Castellini, M.A., **Apnea tolerance in the elephant seal during sleeping and diving: physiological mechanisms and correlations,** Elephant seals: population ecology, behavior, and physiology. Edited by B.J. Le Boeuf and R.M. Laws, Berkeley, University of California Press, 1994, p.343-353, 26 refs.

DLC QL737.P64E44 1994

To better understand the diving behavior of elephant seals, it is necessary to study how their diving physiology limits their diving behavior and how behavior fits into the window of physiological options. Unfortunately, the diving physiology of elephant seals is very difficult to study because the seals are at sea and inaccessible during most of the year. However, when on land, they exhibit long duration breath holds during sleep that can last over 20 minutes. By studying these periods of breath holding during sleep, the authors have found that the physiology of sleep apnea appears to be very similar to the physiology of diving apnea. It is suggested that the control processes involved in both states may be similar enough to allow study of some aspects of diving physiology by instead examining the animals while they hold their breath on land. This relatively new aspect of seal research has focused primarily on Weddell seals and southern elephant seal pups. (Auth. mod.)

B-52360

Fedak, M.A., et al, **Expenditure, investment, and acquisition of energy in southern elephant seals,** Elephant seals: population ecology, behavior, and physiology. Edited by B.J. Le Boeuf and R.M. Laws, Berkeley, University of California Press, 1994, p.354-373, 28 refs.

DLC QL737.P64E44 1994

Information on energy use in elephant seals was collected during breeding and molt over four field seasons at South Georgia. Weight and body composition changes of mothers, pups, and breeding males were monitored during the breeding season. These changes were also measured in adult females, before and after the 70-day period when animals fed at sea between breeding and molt. During this period, information on foraging movements and behavior was gathered using satellite-relay data loggers. Body composition changes were measured using isotope dilution techniques. Breeding energetics information is discussed in relation to the evidence for differential investment in male and female pups. There is no evidence that mothers invest more energy (either relative or absolute) in male pups after birth once female size and birth weight are taken into account. (Auth. mod.)

B-52361

Bryden, M.M., **Endocrine changes in newborn southern elephant seals,** Elephant seals: population ecology, behavior, and physiology. Edited by B.J. Le Boeuf and R.M. Laws, Berkeley, University of California Press, 1994, p.387-397, 21 refs.

DLC QL737.P64E44 1994

The structure and function of some endocrine organs (hypophysis, thyroid, and pineal gland) of newborn southern elephant seals and their role in maintaining homeothermy are reviewed briefly. The adrenal gland is probably important, particularly in the immediate perinatal period, but it has not been examined yet. The predominant cell in the hypophysis of the newborn seal is the somatotroph, suggesting that secretion of growth hormone is a major function of the gland during suckling, when pups grow rapidly. The degree of control of other endocrine organs by the hypophysis in newborn seals is unknown. The thyroid gland is large, with histological evidence of activity at and soon after birth. The thyroid hormones T3 and T4, present in circulating blood at birth, are elevated within the subsequent two hours and remain high for approximately the first week postpartum. As circulating thyroid hormones decline, metabolic rate probably declines also, but direct measurements have not been made. The pineal gland is very large and active in newborn southern elephant seals and remains so until 7 to 10 days postpartum. Circumstantial evidence suggests it is involved in the control of thermogenesis in early postnatal life. (Auth.)

B-52363

Froneman, P.W., Perissinotto, R., McQuaid, C.D., Laubscher, R.K., **Summer distribution of netphytoplankton in the Atlantic sector of the southern ocean,** *Polar biology,* Jan. 1995, 15(2), p.77-84, Refs. p.83-84.

The surface distribution of netphytoplankton (>20 µm) in the South Atlantic Ocean was investigated along two transects during early and late austral summer 1990-91. Peaks in total diatom abundances were recorded at the Antarctic Polar Front (APF), in the vicinity of the South Sandwich Is., in the marginal ice zone and in the neritic waters of the Atlantic sector of Antarctica. Cluster analysis indicates the existence of two major zones between Southern Africa and Antarctica. Diatom abundance increased south of the APF along both transects, which can be partially explained by gradients of silicate concentration. Small chain-forming species (e.g. *Fragilariopsis kerguelensis* and *Nitzschia lineata)* dominated the diatom assemblages in early summer, while larger species such as *Rhizosolenia hebetata f. semispina* and *Corethron criophilum* dominated late summer diatom assemblages. (Auth. mod.)

B-52364

Banse, K., **Antarctic marine top predators revisited: homeotherms do not leak much CO_2 to the air,** *Polar biology,* Jan. 1995, 15(2), p.93-104, Refs. p.102-104.

Gross growth efficiencies observed for populations are applied to reasonably detailed box models of food webs of coastal antarctic waters and the marginal ice zone. Seabirds, seals and whales apparently exhale <3% of primary net production as CO_2 into the atmosphere. For the southern ocean at large, the figure may be <2%. (Auth.)

B-52366

Bölter, M., **Distribution of bacterial numbers and biomass in soils and on plants from King George Island (Arctowski Station, maritime Antarctica),** *Polar biology,* Jan. 1995, 15(2), p.115-124, 36 refs.

Bacterial numbers and biomass associated with soils and plants from King George I. were analyzed by epifluorescence microscopy. Sampling was carried out during austral summer 1992-93 at different sites near Arctowski Station. The sites were located at areas with different plant cover. Soil samples were taken to a depth of 50 cm. All microscopic analyses were carried out in the laboratory immediately after sampling. The bacterial community showed great variations related to soil organic matter and plant cover. Highest values in number and biomass of bacteria were found in the surface layers as well as on leaves of *Deschampsia antarctica* and *Colobanthus quitensis.* Lichen *(Usnea antarctica, U. aurantiaco-atra)* were much less covered with bacteria. Mean cell volume of bacteria can be regarded as an important descriptor of the bacterial community. Changes in this parameter can be related to environmental factors. Fungi and yeasts were seldom observed. (Auth.)

B-52367

Pestarino, M., Mandich, A., Massari, A., **Evidence for enkephalin-like antigenic determinants in the gonads of the icefish *Chionodraco hamatus*,** *Polar biology,* Jan. 1995, 15(2), p.125-130, Refs. p.129-130.

A possible involvement of enkephalin-like substances in the control of gonadal activities has been suggested in vertebrates. Recently, proopiomelanocortin-related peptides have been detected in the gonads of amphibians and teleosts living in temperate waters. The aim of this study was to look for enkephalin-like peptides in the ovary and in the testis of the icefish *Chionodraco hamatus.* Results confirmed the presence of enkephalinergic systems in the gonads of antarctic notothenioid fishes. (Auth.)

B-52368

Vazquez, S.C., Rios Merino, L.N., MacCormack, W.P., Fraile, E.R., **Protease-producing psychrotrophic bacteria isolated from Antarctica,** *Polar biology,* Jan. 1995, 15(2), p.131-135, 37 refs.

The extracellular protease production capacity of 840 bacterial strains isolated during the austral summers of 1989-90 and 1991-92 from different sources of the antarctic ecosystem was analyzed in skim-milk agar plates. Thirty-four psychrotrophic strains were selected, classified at genus level and tested from proteolytic activity by the azocasein method from the cell-free supernatant of submerged cultures. Thirty-two of the selected strains were Gram-negative bacteria and *Pseudomonas* was the predominant genus. Three *Pseudomonas maltophilia* strains showed the highest levels of proteolytic activity at 20°C. No correlation was observed between the proteolytic activity estimated by the ring of hydrolysis in skim-milk agar plates and the activity measured by the azocasein method. The results suggest that these psychrotrophic strains are potentially useful for developing a biotechnological process to produce proteases with high activity at moderate temperatures. (Auth.)

B-52369

Morales-Nin, B., Palomera, I., Schadwinkel, S., **Larval fish distribution and abundance in the Antarctic Peninsula region and adjacent waters,** *Polar biology,* Jan. 1995, 15(2), p.143-154, Refs. p.153-154.

The spatial distribution, species composition and abundance of ichthyoplankton in the Bransfield Strait and adjacent waters were studied during two cruises in the antarctic spring 1991-92 and summer 1992-93 seasons. A multiple plankton net (Bioness) and a Bongo net were used to collect samples at 35 stations in 1991-92 and 75 stations in 1992-93. Early larval stages (14 species) and juveniles (13 species) representing the known Bransfield Strait ichthyofauna were present in the water column. The nototheniids predominated in the entire study area. The greatest species diversity was found in the uppermost 200 m of the water column in the Bransfield Strait. *Notothenia gibberifrons* and *Nototheniops larseni* dominated in spring, whilst in summer *Pleuragramma antarcticum* dominated in association with *N. larseni.* The dominant species in the Gerlache Strait were *P. antarcticum* and *Notothenia kempi,* while *P. antarcticum* and *Trematomus scotti* were predominant in the Bellingshausen Sea area. (Auth.)

B-52377

Ray, M.K., Kumar, G.S., Shivaji, S., **Phosphorylation of membrane proteins in response to temperature in an antarctic *Pseudomonas syringae*,** *Microbiology,* Dec. 1994, 140(12), p.3217-3223, 30 refs.

Temperature-dependent phosphorylation and dephosphorylation of membrane proteins was studied *in vitro* in a number of psychrotrophic antarctic bacteria which grow between 0 and 30°C. One of them, a *Pseudomonas syringae* isolate, was studied in detail and was found to have three membrane proteins of molecular mass 30, 65 and 85 kDa which were phosphorylated differently in response to low and high temperatures. The 65 kDa protein was phosphorylated only at lower temperatures (between 0 and 15°C). The 30 kDa protein was phosphorylated more at higher temperatures and was possibly a histidine kinase. This protein was present in all the psychrotrophic *Pseudomonas* species studied and in *Sphingobacterium antarcticus.* A possible role for these proteins in sensing ambient temperature is proposed. (Auth.)

B-52378

Clayton, M.N., **Evolution of the antarctic marine benthic algal flora,** *Journal of phycology,* Dec. 1994, 30(6), p.897-904, Refs. p.902-904.

The antarctic marine benthic flora is characterized by a low species richness. Biogeographical characteristics of the flora are outlined. There is a high degree of endemism, possibly around 35-40%. Other major floristic elements are a group of species with a distribution extending to Tierra del Fuego and subantarctic islands, a group spread through temperate regions of the Southern Hemisphere, and a cosmopolitan group. Ecological observations show that ice has a major effect on the occurrence and distribution of algae, and ecophysiological studies indicate that antarctic macroalgae possess various adaptions to ice, low temperatures, and strongly seasonal light conditions. Possible trends in the evolution of the antarctic benthic marine flora, including a reduction in species richness and the origins of biogeographical links with subantarctic and temperate regions of the Southern Hemisphere, are discussed in the context of tectonic and climatic changes over the past 100 million years. A comparison is made with studies on the evolution of shallow-water marine fauna. (Auth. mod.)

B-52401

McClintock, J.B., et al, **Homarine as a feeding deterrent in common shallow water antarctic lamellarian gastropod *Marseniopsis mollis*: a rare example of chemical defense in a marine prosobranch,** *Journal of chemical ecology,* Oct. 1994, 20(10), p.2539-2549, 39 refs.

The common bright yellow antarctic lamellarian gastropod *Marseniopsis mollis* was examined for the presence of defensive chemistry. NMR spectroscopy indicated that a major component of ethanolic extracts purified by reversed-phase column chromatography was homarine. Further high-performance liquid chromatography (HPLC) analysis verified the presence of homarine in all body tissues at concentrations ranging from 6 to 24 mg/g dry tissue. A conspicuous macroinvertebrate predator of the shallow antarctic benthos, the sea star *Odontaster validus* always rejected live individuals of *M. mollis,* while readily feeding on pieces of fish tail muscle. The highest concentration of homarine tested not only caused feeding deterrence, but in several sea stars a flight response was noted. Homarine was not detected in the tunic of an antarctic ascidian, a presumed primary prey of *M. mollis.* Nonetheless, crude extracts of the epizooites that foul the tunic contain homarine, suggesting *M. mollis* may ingest and derive its chemistry from these organisms. This appears to be only the third example of chemical defense in a member of the Order Mesogastropoda. The findings of this study lend support to the hypothesis that chemical defense evolved prior to shell loss in shell-less gastropods. (Auth. mod.)

B-52413

Eastman, J.T., Lannoo, M.J., **Diversification of brain morphology in antarctic notothenioid fishes: basic descriptions and ecological considerations,** *Journal of morphology,* Jan. 1995, 223(1), p.47-83, 90 refs.

To provide a baseline morphology, examination is made of the gross morphology and histology of the brain of *Trematomus bernacchii,* a generalized member of the family Nototheniidae, followed by examination of the variation in brain gross anatomy (32 species) and histology (10 species) of other notothenioids. The results show that, in general, notothenioid brains are more similar to the brains of temperate perciforms than to the unusual brains of cave-dwelling and deep-sea fishes. Interspecific variation in gross brain morphology is comparable to that in Old World cyprinids and is illustrated for 17 species. Variation is especially noteworthy in the ecologically and geographically diverse family Nototheniidae. Measurements indicate that sensory regions exhibit the most pronounced variation in relative surface area. Association areas exhibit moderate variation in size, shape, and lobation patterns. Regulatory areas of the brain, are also variable. These regions are best developed in species living in the subfreezing water close to the continent. (Auth. mod.)

B-52414

Coombs, S., Montgomery, J., **Function and evolution of superficial neuromasts in an antarctic notothenioid fish,** *Brain, behavior and evolution,* Dec. 1994, 44(6), p.287-298, 45 refs.

Extracellular recording techniques were used to measure frequency response functions of anterior and posterior lateral line nerve fibers innervating superficial neuromasts at five different locations on the head and trunk of an antarctic nothenioid fish, *Trematomus bernacchii.* Scanning electron microscopy was used to measure neuromast size according to location. Fibers innervating neuromasts from all locations were similar in showing equal responsiveness in the 10-30 Hz range to equal pk-pk velocity levels of a sinusoidally vibrating sphere. The mean cut-off frequency (CF) at which responsiveness declined to 50% of maximum was 46 Hz for all fibers combined. Superficial neuromasts located on the ventral trunk line were three to six times larger in surface area than most other neuromasts. The mean CF for fibers innervating these large neuromasts was 7-18 Hz lower than mean CFs corresponding to other superficial neuromast locations, but small differences in mean CFs were not consistently related to neuromast. (Auth. mod.)

B-52415

Shilling, F.M., Manahan, D.T., **Energy metabolism and amino acid transport during early development of antarctic and temperate echinoderms,** *Biological bulletin,* Dec. 1994, 187(3), p.398-407, 33 refs.

The rates of oxygen consumption by embryos of antarctic echinoderms were compared to the biomass (ash-free dry organic weight) of the egg of each species. These species could survive for 10 months to 5 years by relying solely on the reserves present in the egg. However, certain species did not use any of the egg's reserves during early development. Embryonic stages of *Odontaster validus* did not decrease in lipid, protein, or total biomass during the first 35 days of development. During the first 42 days of development, embryos of *Acodontaster hodgsoni* used protein as an energy source. For both species lipid composed 40 to 50% of egg biomass, but was not used as an energy reserve. Larvae of *O. validus* have a high-affinity transport system for amino acids dissolved in seawater. The rate of alanine transport from a low concentration (50 n/M) could supply 32% of the larva's metabolic needs. This is a 10-fold higher input to metabolism than was determined (3% at 50 n/M) for larvae of a temperate asteroid, *Asterina miniata.* (Auth. mod.)

B-52418

Montgomery, J., Coombs, S., Janssen, J., **Form and function relationships in lateral line systems: comparative data from six species of antarctic notothenioid fish,** *Brain, behavior and evolution,* Dec. 1994, 44(6), p.299-306, 23 refs.

Many of the canals within the species belonging to the genus *Trematomus* are relatively straight-sided tubes with diameters around 0.4 mm. Relatively small pores lead into large tubules, the walls of which appear partially membranous, and the canals not much more than constrictions between adjacent tubules. *Dissostichus mawsoni,* a large species, has canals with distinctive wide and narrow sections, 1.8 mm and 0.48 mm, respectively. Despite these morphological differences, the frequency response characteristics of anterior lateral line units are remarkably similar in all six species. In the case of *D. mawsoni,* this functional similarity results from narrow sections of the canals, which provide the viscous resistance to flow that preserves the mechanical filtering properties of the canal despite the huge size difference between *D. mawsoni* and the other species. It is argued that the most appropriate way to view canals is as high-pass filters which attenuate lower frequencies, and that this effect is best illustrated by comparing the frequency response characteristics of superficial and canal neuromasts using a sinusoidal stimulus that has a constant peak-to-peak velocity. (Auth. mod.)

B-52423

Zúñiga, G.E., Alberdi, M., Fernández, J., Móntiel, P., Corcuera, L.J., **Lipid content in leaves of *Deschampsia antarctica* from the maritime Antarctic,** *Phytochemistry,* Oct. 1994, 37(3), p.669-672, 21 refs.

Deschampsia antarctica plants were collected on Robert I. and frozen in liquid nitrogen. Polar lipids and the composition of fatty acids in phospholipids and galactolipids were analyzed in leaves and roots. Compared to other Gramineae, no unusual contents were found in polar lipids and the degree of unsaturation of fatty acids in most lipid fractions was not unexpected. The highest unsaturation ratio (unsaturated/saturated fatty acids) of 3.3 was found in the phosphatidylinositol fraction. Although summer ambient temperatures at Robert I. are usually around 0°, leaves often reach higher temperatures, which are near their photosynthetic optimum. (Auth.)

B-52443

Roberts, N.J., Burton, H.R., **Volatile compounds in meromictic lakes and basins,** *Chemosphere,* Oct. 1994, 29(8), p.1627-1637, Refs. p.1636-1637.

Thirteen meromictic antarctic lakes and basins were sampled for volatile compounds throughout 1991. Their physical characteristics varied widely in surface density, bottom density, bottom temperatures, bottom redox potential, maximum depth and depth of oxycline. Nineteen compounds were identified and a further 8 were tentatively identified using a Gas Chromatograph-Mass Selective Detector (GC-MSD). Volatile compounds detected included CS_2, dimethylsulfide, polysulfides, substituted benzenes, thiophenes, octane and 6-methyl 5-hepten-2-one. In general, the concentration of volatile compounds increased with depth in the water column, with a further increase in concentration observed in the sediment. The speciation of volatiles in each site was correlated with its physical characteristics. The predominant environmental factor that influenced the distribution of volatile compounds was density. However, this was modified by the temperature of the water column in heliothermal lakes. Some potential sources of the compounds are discussed in relation to the physical nature of the lakes. (Auth. mod.)

B-52444

Ingole, B.S., Parulekar, A.H., **Limnology of freshwater lakes at Schirmacher Oasis, East Antarctica,** *Indian National Science Academy. Proceedings,* 1993, 59(6), p.589-599, Refs. p.598-599.

DLC QH301.N3A

Ten freshwater lakes in the Schirmacher Oasis, with water temperature varying from 1.0 to 7.9 deg, dissolved oxygen from 10.4 to 13.8 mg/l and pH from 7.6 to 8.8, were studied biologically during Jan.-Feb. of 1985 and 1987. The nutrient concentrations showed wide fluctuations, with some lakes showing very low levels of nitrate and phosphate. The concentrations of dissolved and particulate carbohydrate indicated high organic matter content. Shallow water microfauna included 7 taxonomic groups with minimum and maximum faunal density of 43 and 823 individuals/10 cm^2 respectively and was recorded from covered and uncovered sediments. Faunal density showed a strong correlation with organic carbon content and sediment texture. (Auth.)

B-52445

Sorokin, IU.I., **Evaluating primary productivity and dynamics of mineral phosphate in the Weddell Sea and Bransfield Strait** [K otsenke pervichnoĭ produktsii i dinamiki mineral'nogo fosfata v more Uedella i v prolive Bransfilda (Antarktika)], *Rossiĭskaia akademiia nauk. Doklady,* Nov. 1994, 339(3), p.401-403, In Russian. 13 refs.

The data indicate that biogenic limitation as a factor regulating the development of phytoplankton is practically nonexistent. The low temperature of antarctic waters during the period of vegetation (0.5-1.5°C) also does not appear to be a factor. Among the basic factors determining the development of phytoplankton in these waters, vertical stability of the water mass within the boundaries of the photosynthesis zone and extended daylight should be noted. (Auth.)

B-52448

Mårtensson, P.E., Nordøy, E.S., Blix, A.S., **Digestibility of krill (*Euphausia superba* and *Thysanoessa* sp.) in minke whales *Balaenoptera acutorostrata*) and crabeater seals (*Lobodon carcinophagus*),** *British journal of nutrition,* Nov. 1994, 72(5), p.713-716, 18 refs.

Apparent digestible efficiency (%DE) was studied by use of dietary Mn as an inert marker in minke whales and crabeater seals which had been eating krill. Median %DE in minke whales (n5) eating krill of the genus *Thysanoessa* sp. (energy density (ED) 23.8 kJ/g) was 93. Median %DE in crabeater seals (n6) eating krill of the species *Euphausia superba* (ED 20.8 kJ/g) was 84, which is significantly lower than the %DE of krill in minke whales (P=0.008). Since the chemical composition in *E. superba* and in *Thysanoessa* sp. is similar, it is suggested that the complex multi-stomached system of minke whales, which contains both chitinase-producing as well as several other types of bacteria, is superior to the single-stomached system of crabeater seals in krill digestion. It is worth noting, however, that the %DE of krill in the crabeater seal is still very high. (Auth. mod.)

B-52452

Pond, D.W., Watkins, J., Priddle, J., Sargent, J.R., **Variation in the lipid content and composition of antarctic krill *Euphausia superba* at South Georgia,** *Marine ecology progress series,* Feb. 9, 1995, 117(1-3), p.49-57, Refs. p.56-57.

Samples of antarctic krill from 8 sites around South Georgia were analyzed for total lipid and lipid class composition. Samples consisted predominantly of immature krill; females were absent from samples from 2 of the 8 sites studied. Individual fresh mass varied from 0.16 to 1.72 g. Lipid amounts varied from 5 to 147 mg/ind. Triacylglycerol (TAG) and phosphatidylcholine were the two most abundant lipid classes in all krill. Multivariate analysis of lipid composition indicated significant overlap between sex-maturity classes, although female krill tended to be distinguished from males by higher proportions of TAG and lower proportions of phosphatidylserine plus phosphatidylinositol. Reproductive investment is implicated in the overall variability in lipid content and composition, with females containing high lipid levels as reserves for egg production, whilst males showed apparent lipid deficits resulting from short-term mobilization of storage material for spermatophore production and attachment. Significant and systematic site-to-site variability in lipid content and composition were evident in the samples, which could not be explained by the sex ratio or krill size. (Auth.)

B-52453

Helmke, E., Weyland, H., **Bacteria in sea ice and underlying water of the eastern Weddell Sea in midwinter,** *Marine ecology progress series,* Feb. 9, 1995, 117(1-3), p.269-287, Refs. p.285-287.

Bacteria in the water beneath the sea ice of the eastern Weddell Sea were homogeneously distributed. Direct counts resembled values from spring and autumn, whereas viable cell counts, total ATP concentrations as well as heterotrophic assimilation and extracellular enzymatic activities were very low, implying a metabolic inactive bacterioplankton. The consolidated sea ice had a very heterogeneous horizontal distribution of microbes. A close relation between bacterial colonization of sea ice and genetic ice classes was revealed. Sea ice of predominantly congelation ice had the lowest bacterial biomass and displayed very low heterotrophic activities, comparable to those of the water column. Samples of older sea ice belonging to the mainly frazil and mixed ice had maximal numbers of bacteria. They often included high proportions of culturable cells and dividing cells as well as large bacteria. The bacteria of these ice classes were active and contributed significantly to the productivity in the Weddell Sea during winter. Predominantly frazil ice was less colonized. (Auth. mod.)

B-52457

Marchant, R., Lillywhite, P., **Survey of stream invertebrate communities on Macquarie Island,** *Australian journal of marine and freshwater research,* 1994, 45(4), p.471-481, 22 refs.

Some 15 sites on 12 streams on Macquarie I. were kick-sampled for invertebrates. Eleven fully aquatic taxa were found: a species of *Iais* (Isopoda:janiridae); six species of oligochaetes (three enchytraeids, one tubificid, one naidid, one phreodrilid); a harpacticoid copepod; two nematode taxa; and *Minona amnica,* a turbellarian. Composition of this depauperate community changed little between sites, although one site disturbed by penguins had clearly fewer taxa. Aquatic insects and fish were absent, apart from three species of semi-aquatic Diptera that occurred very sparsely. In terms of biomass, the streams were dominated by the oligochaetes.

B-52458

Hindell, M.A., Bryden, M.M., Burton, H.R., **Early growth and milk composition in southern elephant seals (*Mirounga leonina*),** *Australian journal of zoology,* 1994, 42(6), p.723-732, 41 refs.

Growth rates and changes in body composition of pups were monitored during the 3-week lactation period of southern elephant seals at Macquarie I. After a slight decrease in weight in the first days post-partum, pups attained a mass of 114±16.6 kg at weaning, representing an average growth rate of 3.53±0.80 kg/day over the entire lactation period. The proportion of body mass represented by fat was less than 3% at birth, increasing to 40.8±12.7% at weaning. Lean tissue mass altered little for most of the lactation period, but did show an increase in the last four days. The fat content of the milk reflected these changes, starting at 16.1±6.98% on Day 1 of lactation and increasing to 39.5±15.2% about the time of weaning. Fat content of the milk was, however, highly variable and at weaning ranged from 7% to 55%. Although the growth rate of the pup was correlated with mass lost by its mother during lactation, there was no relationship between maternal mass and weaning weight of pups. It is suggested that growth rates may be related to maternal condition and not simply mass, and also that differences in growth rates between populations of southern elephant seals are related to maternal energy reserves. (Auth. mod.)

B-52471

McGrath, J., Wagener, S., Gilichinskiĭ, D.A., **Cryobiological studies of ancient microorganisms isolated from the Siberian permafrost,** Viable microorganisms in permafrost. Edited by D. Gilichinskiĭ, Pushchino, Pushchino Scientific Center, Institute of Soil Science and Photosynthesis, RAN, 1994, p.48-67, Refs. p.65-67.

Studies were conducted on viable microorganisms isolated from ancient Siberian permafrost soil. These microorganisms were probably frozen in conditions similar to those in Antarctica today. Light microscopy revealed that permafrost microbes produce gelatinous sheaths detected by electron microscopy that are consistent with similar structures in antarctic microbes. Cold adaptation associated with alterations in cellular fatty acid saturation is reported for the first time for Siberian permafrost microbes. Whole cell fatty acid analysis revealed an increase in monounsaturated fatty acid content and a decrease in saturated fatty acid content for cells grown at 4°C relative to those grown at 15°C. These results are in agreement with general patterns of cold adaptation in modern organisms, including microorganisms. (Auth. mod.)

B-52472

Bester, M.N., Van Jaarsveld, A.S., **Sex-specific and latitudinal variance in postnatal growth of the subantarctic fur seal *(Arctocephalus tropicalis)*,** *Canadian journal of zoology,* June 1994, 72(6), p.1126-1133, With French summary. 50 refs.

Parameter estimates reflecting age-specific growth of subantarctic fur seals on Gough I. were fitted to 3 sigmoidal (Gompertz, logistic, and von Bertalanffy) growth curves. With a few exceptions, the logistic fit provided the best mathematical approximation of postnatal growth in fur seals from Gough I., although all fits were significant. Standard length is a better reflection of age-specific changes in size than mass, which displayed considerable variance. Growth was characterized by marked sexual dimorphism. Interisland comparisons of body size throughout the geographic range of the species suggested a latitudinal graded difference in adult body size, with the largest animals occurring at low-latitude Amsterdam I. and the smallest at Marion I., which lies just north of the Antarctic Polar Front. (Auth. mod.)

B-52473

Coppellotti, O., **Effects of cadmium on *Uronema marinum* (Ciliophora, Scuticociliatida) from Antarctica,** *Acta protozoologica,* Aug. 1994, 33(3), p.159-167, Refs. p.166-167.

The toxic effects of cadmium, a heavy metal cation which is important as an environmental pollutant, were studied on cultures of *Uronema marinum,* a scuticociliatid isolated from seawater and sandy sediments collected in Terra Nova Bay. *U. marinum* cells were sensitive to cadmium at doses as low as 2μg/ml (18 μM). The metal is mostly accumulated in the sediment fraction, probably linked to membranes and cytoplasmic organelles. Transmission electron microscopy indicated generalized damage of cell ultrastructure. The lack of specific Cd-binding compounds may explain the toxic effect observed. (Auth.)

B-52475

Bargelloni, L., Ritchie, P.A., Patarnello, T., Battaglia, B., Lambert, D.M., Meyer, A., **Molecular evolution at subzero temperatures: mitochondrial and nuclear phylogenies of fishes from Antarctica (Suborder Notothenioidei), and the evolution of antifreeze glycopeptides,** *Molecular biology and evolution,* Nov. 1994, 11(6), p.854-863, Refs. p.861-863.

Most fishes of the perciform suborder Notothenioidei are endemic to the subzero marine waters of Antarctica. A number of remarkable physiological attributes allow them to inhabit this extreme environment; for example, the blood of almost all notothenioid species contains antifreeze glycopeptides. To establish a molecular phylogenetic hypothesis for these fishes, DNA sequences from two mitochondrial genes, portions of the 12S and 16S ribosomal genes (928 base pairs [bp]), were determined for 18 species. These belong to 15 genera in five families of the suborder. The DNA data suggest that two of these families are unnatural groups and that the classification and phylogeny of this suborder is in need of revision. On the basis of molecular phylogeny, the evolution of antifreeze glycopeptides was studied. The age of the radiation of notothenioid fishes had been estimated to be at least 38 My. However, the level of mtDNA variation detected in notothenioid fishes appears to be too low to agree with this date of origin and might instead suggest a younger age (10-15 My). (Auth. mod.)

B-52507

Pankow, H., Haendel, D., Richter, W., **Floral algae of the Schirmacher Oasis, East Antarctica** [Die Algenflora der Schirmacheroase (Ostantarktika)], *Nova Hedwigia. Beiheft,* 1991, No.103, 193p. + 2p. color photographs, In German with English summary. Refs. p.164-176.

DLC QK504.N62 Heft 103

The Schirmacher Oasis is one of the small rock deserts of East Antarctica. In spite of its location near the coast, ecological conditions are markedly continental because the oasis is separated from the ocean by a belt of shelf ice about 80 km wide. Cold katabatic winds of constant direction are dominant and promote arid conditions. But the high aridity of solid and loose rock is partially interrupted during the short austral summer when melting processes produce a brief, closed continental water cycle, which in turn gives algae, lichens and mosses a suitable growth environment. Freshwater algae show a high degree of adaptation to different ecological niches. They are widespread in lakes, running waters, warmed shore waters, and in small ponds and watercourses, as well as in the form of so-called ink-stripes. Moreover, algae colonize mosses as a preferred habitat. On the land surface special adaptations occur in sub- and endolithic habitats, mostly in fissured quartz or pegmatites. (Auth. mod.)

B-52516

Helmuth, B., Veit, R.R., Holberton, R., **Long-distance dispersal of a subantarctic brooding bivalve (*Gaimardia trapesina*) by kelp-rafting,** *Marine biology,* Oct. 1994, 120(3), p.421-426, 41 refs.

The probability of successful dispersal by sessile benthic invertebrates is thought to strongly influence their geographic distribution and population genetics. One potential factor that has been invoked as an explanation is dispersal by floating and rafting of adults and egg masses. Evidence is presented of long-distance (1300 to 2000 km) dispersal of the brooding pelecypod *Gaimardia trapesina* in the southern ocean in the vicinity of Cape Horn, the Falkland Is., and South Georgia. Data on survival and fecundity rates of *G. trapesina* and the prevalence of kelp rafts collected during the austral winter of 1993 indicate that dispersal by rafting can occur over ecologically relevant time scales and could potentially serve as a significant means of genetic exchange between populations. (Auth. mod.)

B-52519

Nutrient reserve dynamics and energetics during long-term fasting in the king penguin (*Aptenodytes patagonicus*), *Journal of zoology,* Sep. 1994, 234(1), p.1-12, 36 refs.

Previous qualitative data have shown that male king penguins adapt to prolonged fasting by mobilizing fat stores and minimizing protein loss, and that this strategy ends with a progressive increase in protein utilization. The present study indicates that during the phase of protein conservation, 93% of the energy produced derives from the oxidation of fat stores, body protein accounting for the remainder (7%). Tissue composition analysis shows that integument is the main lipid source during this period, and that pectoral muscles provide the majority of body protein. If the fast is prolonged until a body mass below 10 kg is reached, there is a progressive four-fold increase in nitrogen excretion, together with a progressive exhaustion of fat stores. This shift in fuel metabolism is not a direct consequence of total lipid depletion, because 22% of the initial fat content still remains when proteins are no longer spared. During this later metabolic phase, protein is not only provided by pectoral muscles but also by hindlimb muscles, and there remains only 2% of the initial amount of lipid in the integument at the end of the fast. (Auth. mod.)

B-52520

Liddle, G.M., **Interannual variation in the breeding biology of the antarctic prion *Pachyptila desolata* at Bird Island, South Georgia,** *Journal of zoology,* Sep. 1994, 234(1), p.125-139, 22 refs.

Interannual variation in the breeding biology of antarctic prions was studied for three summers at Bird I. Egg size, mass and incubation period remained constant. Laying, hatching and fledging were significantly delayed and less synchronous in 1991-92. This was due to an unusually cold and protracted winter, with ice blocking burrows into the spring, restricting availability of nest sites. Brooding lasted longer in 1991-92 but the overall fledging period was unchanged. Skeletal growth rates did not vary between years; growth in mass was slower in 1989-90 but fledging mass was similar in all three years. In 1989-90 and 1991-92 the later-hatched chicks grew (in mass) faster. The survival of chicks from hatching to fledging did not vary between years or with hatching date. Feeding frequency was similar between years, once allowance had been made for starlit nights. Thus late and asynchronous breeding in 1991-92 did not result in reduced breeding success either through predation or starvation. (Auth. mod.)

B-52521

Voronina, N.M., Maslennikov, V.V., **Plankton as an indicator of water transport in the Antarctic,** *Oceanology,* June 1994, 33(5), p.631-634, Translated from Okeanologiia 33(5) Sep./Oct. 1993. 17 refs.

Studies were done on net plankton in the 0-1500 m layer along the section from Adelaide I. to the Pennell Coast and in the region northeast from the Balleny Is. The bulk of the organisms comprised a typical antarctic copepoda complex: *Calanoides acutus, Calanus propinquus* and *Rhincalanus gigas,* although different waters had their own specific features. The low-latitude Antarctic Circumpolar Current area was characterized by the occurrence, mainly in deep waters, of species with the polar frontal and subantarctic ranges *(Euphausia triacantha, C. simillimus, Eucalanus longiceps, E. hyalinus).* The high-latitude coastal antarctic current was characterized by an abundance of krill larvae. The mixed waters of the Ross gyre did not contain the northern inhabitants at all, and krill were scarce. (Auth. mod.)

B-52522

Pakhomov, E.A., Grachev, D.G., Trotsenko, B.G., **Distribution and composition of macroplankton communities in the Lazarev Sea (Antarctic),** *Oceanology,* June 1994, 33(5), p.635-642, Translated from Okeanologiia 33(5) Sep./Oct. 1993. 33 refs.

Based on a complex Lazarev Sea survey in Jan.-Feb. 1990, the macroplankton composition, abundance and distribution in the upper 200 m layer are described. Average abundance was 3350 specimen/1000 m^3, and biomass 31 g/1000 m^3. Three communities were identified by cluster analysis; each inhabited waters of specific modification. The status of these communities is discussed. (Auth.)

B-52525

Andriiashev, A.P., **Review of Liparidae (Scorpaeniformes) from subantarctic islands of the Indian Ocean, with a description of a new species of *Paraliparis*,** *Journal of ichthyology,* Mar. 1995, 34(8), p.1-9, Translated from Voprosy ikhtiologii, 34(3):293-297, 1994. 12 refs.

Until recently, not a single liparid species was known from the vast region of the Indian Ocean from Marion I. east to Macquarie I. This study reviews ten species of liparids (genera *Notoliparis, Careproctus, Paraliparis, Psednos)* found off the subantarctic islands of the Indian Ocean and includes a key to identification with a description of a new species *(Paraliparis duhameli* sp. n.). Diagnoses of all species are published here for the first time. (Auth.)

B-52527
Voskoboinikova, O.S., **Rate of individual development of the bony skeleton of eleven species of the family of Nototheniidae,** *Journal of ichthyology,* Mar. 1995, 34(8), p.108-120, Translated from Voprosy ikhtiologii 34(4):501-508, 1994. 52 refs.

A comparative analysis was made on rates of development of the bony skeleton in eleven species of nototheniid fishes based on the times of origin of different bony elements in the early stages of ontogeny. Nototheniid fish are characterized by retarded differentiation of the bony skeleton compared to other perciforms from temperate and tropical waters. A gradual slowing of the process of bony skeleton development is found in the Nototheniidae with an increase in the degree of morphological specialization of the subfamilies. This is considered a mechanism of pedomorphic evolution. (Auth.)

B-52528
Bischoff, B., Wiencke, C., **Temperature ecotypes and biogeography of Acrosiphoniales (Chlorophyta) with Arctic-Antarctic disjunct and Arctic/cold-temperate distributions,** *European journal of phycology,* Feb. 1995, 30(1), p.19-27, 41 refs.

The temperature requirements for growth and the upper survival temperatures (UST) of the Antarctic-Arctic disjunct green alga *Acrosiphonia arcta* and of the Arctic/cold-temperate *A. sonderi* (Acrosiphoniales) from several localities within their distribution areas were determined. Ecotypic variation with regard to growth optima as well as survival temperatures were demonstrated in both species. While cold-temperate strains had relatively high or optimal growth rates at 15°C, polar isolates had very low rates at this temperature and showed growth optima between 0 and 10°C. The UST of the polar isolates of *A. arcta* is 22°C, i.e. slightly lower than those of the cold-temperate strains at 23-25°C. The cold-temperate isolate of *A. sonderi* survived to 25°C, whereas arctic strains had USTs of 22-24°C. The data indicate that changes in growth responses to temperature as well as small changes in UST can be achieved in relatively short time periods of exposure (3 million years) to low temperatures as exemplified in arctic populations of *A. arcta* as well as *A. sonderi.* (Auth. mod.)

B-52529
Thomsen, H.A., Bjørn, P. de P., Højlund, L., Olesen, J., Pedersen, J.B., ***Ericiolus* gen. nov. (Prymnesiophyceae), a new coccolithophorid genus from polar and temperate regions,** *European journal of phycology,* Feb. 1995, 30(1), p.29-34, 16 refs.

During late Aug. 1985, a significant coccolithophorid contribution to phytoplankton biomass and diversity was evident in the inner Danish waters of the southern Kattegat and the Isefjord. The material included new taxa, one of which, *Ericiolus spiculiger* gen. et sp. nov., is now formally described together with a second antarctic species from the same genus, *E. frigidus* sp. nov. The genus comprises small, apparently heterotrophic species with a single type of calcified structure reminiscent of caltrops. (Auth.)

B-52533
Massin, C., **Ossicle variation in antarctic dendrochirote holothurians (Echinodermata),** *Brussels. Institut Royal des Sciences Naturelles de Belgique. Bulletin,* 1994, Vol.64, p.129-146, With French summary. 32 refs.

A study of ossicle variation in Cucumariidae coming from the Weddell Sea, with specimens ranging from 4 to 70 mm long, confirms that *Heterocucumis steineni, H. antarctica,* and *H. godfroyi* represent different stages of a single species: *H. steineni.* A study of *H. steineni, H. denticulata* and *Staurocucumis liouvillei* shows that the main ossicle change occurs early when specimens are 20 mm long or less. A review of holothurian ossicle variation is given. (Auth. mod.)

B-52535
Nothnagel, J., **Effects of salinity and light intensity on osmolyte concentrations, cell volumes and growth rates of the antarctic sea ice diatoms *Chaetoceros* sp. and *Navicula* sp. with emphasis on the amino acid proline** [Der Einfluß von Salinität und Lichtintensität auf die Osmolytkonzentrationen, die Zellvolumina und die Wachstumsraten der antarktischen Eisdiatomeen *Chaetoceros* sp. und *Navicula* sp. unter besonderer Berücksichtigung der Aminosäure Prolin], *Berichte zur Polarforschung,* 1995, No.161, 115p., In German with English summary. Refs. p.106-114.

The effect of light intensity and salinity on growth rates, cell volume and concentrations of osmolytes of the antarctic ice diatoms *Chaetoceros* aff. *neogracile* and *Navicula* sp. were investigated in laboratory experiments. No severe effect of salinity on the growth rates and cell volumes could be observed in the range of 17 to 51 PSU (= per mill) at high photon flux density (50 μmol photons/m^2/s) for *Navicula* sp., whereas *Chaetoceros* sp. showed significant responses: with increasing salinity, growth rates and cell volumes decreased. Under low light conditions (5 μmol photons/m^2/s) growth rates and cell volumes were clearly reduced and no salinity effect could be detected. The population density increased with rising salinity at both low and high light intensities. The ice algae survived long-term dark incubations of 56 d and 84 d. The diatoms, pre-incubated at low light intensities, showed a slight increase in cell number and a considerable decrease in proline concentration with advancing incubation period. The proline concentration of all samples did not decrease below a salinity-dependent, species specific minimum, which was enhanced with increasing salinity. Proline probably acts as a nitrogen source during the dark period. (Auth. mod.)

B-52539
Battaglia, B., ed, Bisol, P.M., ed, Varotto, V., ed, **Proceedings of the 2nd Meeting on "Antarctic Biology", Padova, Dipartimento di Biologia dell'Universitá, 26-27-28 Feb., 1992** [Atti del Secondo Convegno di "Biologia Antartica". Riassunti in Italiano], Padova, Edizioni Universitarie Patavine, 1944, 296p., With Italian summaries. Refs. passim. For individual papers see B-52540 through B-52546, B-52548 through B-52563 and F-52547.

This volume represents the second coordinated contribution of Italian biologists to the Programma Nazionale di Ricerche in Antartide (National Program of Antarctic Research). It contains a collection of papers presented at a meeting held in Padova, Italy, Feb. 26-28, 1992. The papers are grouped into the following categories: flora, fauna and biogeography; evolutionary biology; and physiological, biochemical and molecular mechanisms of adaptation.

B-52540
Castello, M., Nimis, P.L., **Revision of yellow *Acarosporaceae* (Lichens) from Antarctica,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.1-18, With Italian summary. 23 refs.

In this study, which is part of a major work, the authors have taken into consideration the species with yellow thallus included in the families *Acarosporaceae* and *Biatorellaceae.* The type material of all antarctic taxa has been studied, and compared with the numerous specimens collected during the Italian expeditions to continental Antarctica (Victoria Land) from 1987 to 1991.

B-52541
Onofri, S., Tosi, S., Persiani, A.M., Maggi, O., Riess, S., Zucconi, L., **Mycological researches in Victoria Land: terrestrial ecosystems,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.19-32, With Italian summary. Refs. p.30-32.

This report is part of a study on the microflora and on its associations with the bryophytic flora carried out by the authors in Victoria Land between 1989 and 1992. Preliminary results of studies on ecophysiological adaptation of the fungal cellular membrane to low temperatures are discussed.

B-52542
Montemartini Corte, A., Gestro, C., **Fungi from mud of antarc-**

tic ponds, Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.33-42, With Italian summary. 21 refs.

A preliminary study on fungi in antarctic ponds in Terra Nova and Wood bays, relative to the campaign 1987-88, was published by Montemartini in 1991. This paper presents the results from the subsequent campaigns (1988-89, 1989-90, and part of 1990-91). Preliminary observations indicated the low frequency of microorganisms in Antarctica, but some sites presented a relatively abundant mycoflora, though limited to a few species, while some others showed only sporadic presences. The reasons for this diversity in spite of the relative homogeneity of the environmental conditions are discussed.

B-52543

Mercantini, R., Marsella, R., Moretto, D., Finotti, E., **Keratinophilic fungi, dermatophytes and anthropization of the Antarctic,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.43-46, With Italian summary. 11 refs.

In recent years there has been a greater presence of human beings in the Antarctic because of the increasing number of visitors and an increase of activities conducted in this area. As a consequence, there is an increasing anthropization of the environment, at least in the areas where urbanization projects involving work of many kinds are currently being conducted. As one of the consequences of this process, the possible spreading of keratinophilic fungi, and especially of dermatophytes, should be considered. The introduction of fungal species, besides constituting a serious problem from an ecological point of view, leads to a question the authors try to answer: what are the risks to the forms of life in the Antarctic, these being theoretically susceptible to the pathogenetic effects of allochthonous dermatophyte strains.

B-52544

Fumanti, B., Alfinito, S., Cavacini, P., **Floristic survey of the freshwater algae of northern Victoria Land (Antarctica),** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.47-53, With Italian summary. 7 refs.

During the Italian Antarctic Expedition of 1989-1990, studies of non-marine algal flora were carried out in northern Victoria Land. Eighty-three algal taxa were identified, 52 of which are new records for northern Victoria Land. Benthic algal mats were found in all the lakes and ponds investigated except the lake situated in the upper area of Markham I. Although mats exhibited some differences in their structure and color, all of them could be classified as moat, prostrate mats, 0.5-3 cm thick. The main component of all the mats was *Phormidium frigidum.* Only in the laminate mats found in the ponds near an Adélie penguin rookery and Baker Rocks was the matrix formed by *Phormidium pristleyi.*

B-52545

Andreoli, C., et al, **Photoautotrophic picoplankton of Terra Nova Bay and of some lakes of northern Victoria Land (Antarctica),** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.55-65, With Italian summary. Refs. 64-65.

Freshwater and seawater photoautotrophic picoplankton studies, carried out between 1978 and 1993 in Terra Nova Bay and various lakes in northern Victoria Land, are reviewed. Results show a remarkable increase in picoplanktonic populations in conditions of extremely low luminosity, which suggests a great degree of environmental adaptation in these organisms.

B-52546

Paganelli, A., Miola, A., **Approach to palynological research in the antarctic continent,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.67-75, With Italian summary. 9 refs.

In order to identify the type of substratum best suited for the accumulation and conservation of palynomorphs over time, samples were taken in the vicinity of the Terra Nova Bay Station from snow and ice, lacustrine and marine sediments, fossil and fresh penguin and skua dung, and from mosses and lichens. The quantity of pollen and spores found in the samples was very small. The pollen grains found belong to arboreal and herbaceous plants; they are subdivided by area of finding and some conclusions are drawn concerning their possible provenance.

B-52548

Vinciguerra, M.T., Binda, M.G., Pilato, G., **Nematodes and tardigrades of Antarctica: results of the researches conducted in 1988-1991,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.83-88, With Italian summary. 11 refs.

A faunistic, biogeographical and taxonomic study of two taxa of Metazoa widespread in all the environments compatible with life of the antarctic continent (Nematoda and Tardigrade) is reported. These two taxa, even though phylogenetically far apart, share some important biological features. Both are represented by microscopical and hydrobiont organisms inhabiting not only the bottoms of the aquatic biotopes but also the wet interstices among the particles of any type of soil, of which they are a fundamental faunistic component, and among the leaflets of mosses and lichens. A further important common character is their ability to survive, even for very long periods, under extremely stressing environmental conditions (lack of water or of oxygen, very low temperatures) by resorting to cryptobiosis.

B-52549

Morescalchi, A., **Cytogenetics and morphofunctional adaptations in Notothenioid fishes,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.93-110, With Italian summary. Refs. p.108-110.

A report is given of studies begun in the 1989-1990 season with the following aims: to expand research on the comparative karyology and other cytogenetic aspects of Notothenioids; to acquire more information on the molecular properties of the osmoregulative apparatus of these mostly aglomerular fishes; and to examine the distribution and molecular nature of oligopeptides having functional roles in both the nervous and the diffuse endocrine systems of Notothenioids.

B-52550

Valbonesi, A., et al, **Speciation and adaptive biology of antarctic ciliated protozoa,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.111-120, With Italian summary. 18 refs.

In a previous report, some new species of ciliates collected from the Ross Sea were described, together with preliminary results obtained from a study of the biology of *Euplotes focardii.* Here the authors describe the following: results from electrophoretic analyses that further support the taxonomic separation of the three new antarctic species of *Euplotes,* i.e., *E. euryhalinus, E. focardii,* and *E. nobilii,* earlier identified only on a morphologic basis; some experimental situations suitable for the development of a rare phenomenon of intraclonal, morphologic, and behavioral polymorphism in *E. focardii;* and the complete primary structure of the β-tubulin of *E. focardii,* deduced from analysis of the coding macronuclear genes.

B-52551

Battaglia, B., et al, **Studies on genetic differentiation in populations of antarctic and subantarctic marine invertebrates,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.121-130, With Italian summary. Refs. p.128-130.

This paper is subdivided into three sections. The first deals with the genetic differentiation between two populations of the harpacticoid copepod *Tigriopus* from Chilean coasts, one of which was collected in a subantarctic region (Magellan Strait). The second section regards cytogenetic investigations conducted on one harpacticoid copepod, one pelagic amphipod and six mollusc species, all of them from Antarctica (Ross Sea). The third section is devoted to the first results of an analysis of the 16S rRNA sequence carried out on samples of krill collected in the Weddell Sea during the EPOS expedition and in the vicinity of South Georgia in 1991.

B-52552
Bullini, L., et al, **Genetic and ecological studies on nematode endoparasites of the genera *Contracaecum* and *Pseudoterranova* in the antarctic and arctic boreal regions,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.131-146, With Italian summary. Refs. p.144-146.

This paper deals with genetic and ecological research carried out on anisakid nematodes of the genera *Contracaecum* and *Pseudoterranova* from the antarctic and arctic-boreal regions. The main points investigated are: the recognition of biological species existing within some morphospecies described in these genera; the genetic relationships among these biological species; the comparison of genetic variation between arctic and antarctic populations; and the geographic distribution, life cycle and host preferences of the species considered. The data were obtained from the PRNA research project, in collaboration with the German Antarctic Expedition.

B-52553
Nicolaus, B., et al, **Thermophilic isolates from Antarctica,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.147-155, With Italian summary. 9 refs.

During the austral summers of 1986-87 and 87-88, samples of soil were collected from three regions in the vicinity of Terra Nova Bay Station on the Ross Sea coast. An investigation was carried out on some morphological and physiological parameters. The vegetative cells of isolates M1 and M2 are straight rods (0.5-2 µm diameter, 3-7 µm long), while isolates M3-M7 are rods (4-8 µm long, 0.5-0.8 µm diameter). The electron micrographs of the isolates are shown in a figure. Growth occurs over a range from 37°C (minimum) to 70-80°C (maximum) with an optimum at 60-65°C; in particular M1 and M4 grew at 37°C. The pH range is from 4.5 to 8.0 with an optimum around pH 6.0. All isolates were aerobic; M2 and M3 were resistant to NaN_3 treatment.

B-52554
Di Prisco, G., et al, **Structure and function of hemoglobins, enzymes and other proteins from antarctic marine and terrestrial organisms,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.157-177, With Italian summary. Refs. p.173-177.

Major aims of this research are the search of correlation between oxygen transport and lifestyle, structure and function of Hb, and evolution of the suborder Notothenioidei. Among the physiological adaptations which are pertinent, it is worth mentioning that blood viscosity decreases through reduction of erythrocytes and Hb. It is shown that in red-blooded antarctic species, under stress-free conditions, Hb does not seem to be necessary for survival. In addition to other species of the families Nototheniidae and Bathydraconidae, studies have been extended to Artedidraconidae. Oxygen transport in penguins and seals is also discussed, as are metal-binding proteins.

B-52555
Gargano, S., Maresca, B., **Molecular biology of adaptation to low temperature: partial cloning of hsp70 genes of two antarctic fish,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.179-186, With Italian summary. 17 refs.

The authors describe experiments carried out with three different species of fish concerning identification of a putative hsp70 sequence in Notothenioids and cloning and sequencing of a hsp70 gene of *Chionodraco hamatus.* The species used in the experiments were *C. hamatus* (high latitude fish), *Pagothenia bernacchii* (present mainly in high latitudes) and *Notothenia rossii* (present primarily in low latitudes). Specimens were caught in Terra Nova Bay and in McMurdo Sound by trawling.

B-52556
Maffia, M., Acierno, R., De Vicienti, A., Storelli, C., **Lipid composition of intestinal cell membranes of the antarctic fish, *Pagothenia bernacchii:* comparative studies with temperate fish *Anguilla anguilla*,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.187-192, With Italian summary. 10 refs.

Studies on cold-adapted fish have shown that the cell membrane physical properties of these poikilotherm animals undergo structural changes in response to the altered temperature. Temperature lowering decreases the disorder and the degree of molecular mobility of the phospholipid hydrocarbon chains, and consequently the membrane fluidity, with dramatic effects on the biochemical and physiological processes. Consequently, one of the most important evolutive adaptations concerning the survival of fish living in the Antarctic is the preservation of cell membrane fluidity at low temperature. In this report, the authors have compared the lipid composition of the intestinal cell membranes of the antarctic teleost *Pagothenia bernacchii* to that of the temperate teleost *Anguilla anguilla* in order to obtain information about the molecular mechanisms by which the antarctic fish can maintain their biological membranes in a fluid state.

B-52557
Tota, B., Acierno, R., Agnisola, C., Harrison, P., Zummo, G., **Morphofunctional design of the heart of the icefish *Chionodraco hamatus* (Lonnberg),** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.193-206, With Italian summary. Refs. p.204-206.

This paper presents data obtained by the authors on two aspects: the mechanical characteristics of the heart of the icefish *Chionodraco hamatus* as revealed by an isolated and perfused working heart preparation; and the structural arrangement of the heart in this species and in *Chaenocephalus aceratus.* The aim is to focus attention on the icefish heart as a muscular pump and to compare it to what is known in other teleosts. Specimens of *C. hamatus,* the most common icefish in Terra Nova Bay, were collected during the 5th and 6th Italian antarctic expeditions. All the physiological experiments were carried out in the laboratories of the Terra Nova Bay Station.

B-52558
Focardi, S., et al, **Chlorinated hydrocarbons, trace elements and mixed function oxidases (MFO) activity in antarctic organisms,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.207-226, With Italian summary. Refs. p.224-226.

Chlorinated hydrocarbons are a class of persistent contaminants that have been present in many ecosystems for some time. In Antarctica, the presence of these contaminants has been associated with the activities of the scientific stations. Analyses of organochlorines carried out in seven species of antarctic fish, collected during the 1987-88, 1989-90 and 1990-91 Italian expeditions, emphasize the considerable differences in enzyme activities of the MFO detoxicant system in the antarctic fish species *Pagothenia bernacchii* and *Chionodraco hamatus.* The low basal activities and absence of induction predisposed the fish to accumulate liposoluble contaminants like chlorinated hydrocarbons.

B-52559
Bargagli, R., Focardi, S., **Preliminary data on heavy metals in surface soil and macrolichens of northern Victoria Land,**

Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.227-234, With Italian summary. 22 refs.

Two species of epilithic macrolichens which are very common in coastal ice-free areas of northern Victoria Land, as well as in other areas of continental or maritime Antarctica, have been shown to be suitable organisms for quantitative biomonitoring of airborne metals. Preliminary results indicate that, when using standardized procedures and minimizing the effect of different local and regional growth rates, it will probably be possible to perform metal biomonitoring in almost all zones of the Southern Hemisphere and to make comparisons with data from the Northern Hemisphere. In northern Victoria Land, surface soils have a very low metal content, whereas lichens accumulate Cd, Pb and above all Hg to levels higher than in other remote areas. The very low concentrations of heavy metals in surface soils and in lichens from the Antarctic Peninsula seem to exclude a systematic contamination of the samples. Thus, other factors could be involved in the higher concentrations of heavy metals in lichen thalli from Victoria Land, including emissions from Mt. Erebus and several fumaroles.

B-52560

Nigro, M., Mauri, M., Regoli, F., Orlando, E., **Ecology and metal distribution in antarctic molluscs,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.235-255, With Italian summary. Refs. p.252-255.

This paper deals with various aspects of metal physiology in molluscs, and presents preliminary results of a quantitative investigation on the population biology and ecology of the antarctic scallop *Adamussium colbecki* from Terra Nova Bay.

B-52561

Viarengo, A., et al, **Cellular and molecular mechanisms of heavy metal cation homeostasis in the cold-adapted antarctic scallop *Adamussium colbecki* (Smith 1902),** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.257-266, With Italian summary. 5 refs.

This study, carried out on the gills and digestive gland of the antarctic scallop *Adamussium colbecki,* considers the following: the role of metallothioneins in Cd homeostasis; the antioxidant defence systems and lipid peroxidation; and the membrane lipid composition. The obtained data indicate that there are no substantial differences in the levels of the antioxidant defence systems of the antarctic scallop compared to those observed in molluscs from temperate waters, whereas the level of lipid peroxidation products (malondialdehyde) was significantly lower. Moreover, large differences in the membrane lipid composition were observed, demonstrating the presence of adaptive mechanisms for maintaining membrane fluidity at low temperatures.

B-52562

Albergoni, V., et al, **Heavy metals and antioxidant enzymes in antarctic Protozoa and fish,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.267-290, With Italian summary. 25 refs.

The authors examined the degree of Cd tolerance in some biological parameters, such as growth and metal accumulation, in two isolated Ciliata, *Uronema marinum* from Terra Nova Bay and *Euplotes rariseta* from the Magellan Strait. *U. marinum* cells were found to be more sensitive to the toxic effects of Cd than those of *E. rariseta*. Metal concentrations were also determined in two species of teleosts, the red-blooded *Pagothenia bernacchii* and the white-blooded *Chionodraco hamatus,* collected in Terra Nova Bay. Liver, muscle, gills, heart, intestine and skin were examined. Results are discussed and presented in tables.

B-52563

Rigoni, F., Barbato, R., Bassi, R., Dainese, P., Giacometti, G.M., **Adaptive mechanisms of the photosynthetic apparatus,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.291-296, With Italian summary. 14 refs.

The study shows that acclimatization to cold in living organisms leads to several metabolic and biochemical changes resulting in an improved functioning of the photosynthetic apparatus. It is suggested that the next step in this research be that of verifying the proposed mechanisms for resistance to low temperature on antarctic organisms which are genetically adapted to these conditions.

B-52564

Wägele, H., **Morphology and taxonomy of the antarctic species of *Tritonia* Cuvier, 1797 (Nudibranchia: Dendronotoidea),** *Linnean Society of London. Zoological journal,* Jan. 1995, 113(1), p.21-46, 22 refs.

The external morphology and anatomy of the antarctic nudibranchs *Tritonia vorax* Odhner, 1926, and *Tritonia antarctica* Pfeffer in Martens & Pfeffer, 1886 are redescribed in detail and compared with other nominal tritoniids from antarctic and subantarctic waters. *Tritonia appendiculata* Eliot, 1905, *T. challengeriana* Eliot, 1907a, non Bergh, 1884, *T. challengeriana* Odhner 1926, non Bergh, 1884, and *Marionia cucullata* Vicente & Arnaud 1974, non (Couthouy, in Gould 1852), are shown to be synonymous with *T. antarctica.* Only *T. antarctica* is a true High Antarctic species, with a distribution around the continental shelf, Antarctic Peninsula and South Georgia. *T. vorax* is confined to South Georgia and subantarctic waters. (Auth.)

B-52569

Hoshiai, T., **Review of the coastal marine ecosystem research at Syowa Station, Antarctica,** *Antarctic record,* 1994, 38(3), p.243-251, With Japanese summary. Refs. p.249-251.

Results of marine biological research on the coastal marine ecosystem in the Showa Station area in conjunction with BIOMASS are reviewed. This research aimed at the collection of year-round information on the basic elements in the ecosystem of the region in the 1982-84 winters. General information on the ecology of bacteria, phytoplankton, ice algae and zooplankton; sinking and decomposing processes of organic particulates produced; overwintering strategy of krill; and ecology of benthos are given. Based on the above investigations, some research topics for a recently proposed international program, "Coastal and Shelf Studies in the Ecology of the Antarctic Sea Ice Zone" are suggested. (Auth.)

B-52573

Knox, G.A., **Biology of the southern ocean,** Cambridge, University Press, 1994, 444p., Refs. p.[381]-429. Pertinent pages to CRREL, p.39-65 and 221-263.

DLC QH95.58.K58 1994

This book commences with a description of the physico-chemical environment and then follows a logical sequence covering phytoplankton and primary production, the sea ice microbial community and zooplankton. There is an extended chapter on the biology and ecology of antarctic krill in view of its central position in the southern ocean food web. In addition, krill have been the subject of intensive research programs over the past two decades, especially during BIOMASS. A series of chapters considers the higher consumers, nekton (with an emphasis on cephalopods), fish, seals, whales and seabirds. Then follows a series of chapters on selected ecosystems: the benthic communities, life beneath the fast ice and ice shelves, marginal ice edge processes, recent advances in understanding the decomposition process and the roles of bacteria and protozoa. These are followed by an attempt at a synthesis of ecosystem dynamics with an emphasis on the pelagic ecosystem. The following three chapters deal with resource exploitation, the impact of such exploitation on the marine ecosystem of the southern ocean, and the problems involved in the management of the living resources. (Auth.)

B-52575

Thompson, K.R., Riddy, M.D., **Utilization of offal and discards from "finfish" trawlers around the Falkland Islands by the Black-browed Albatross *Diomedea melanophris*,** *Ibis,* Apr.

1995, 137(2), p.198-206, 8 refs.

Multinational fisheries operating in the vicinity of the Falkland Is. currently take ca. 90,000 tonnes of true fish ("finfish" as opposed to squid) per annum, including hake, Southern Blue Whiting, Hoki and Red Cod, and generate substantial quantities of fisheries waste in the form of discards and offal. This paper examines the use made of this waste by scavenging Black-browed Albatrosses which breed in the Falklands. The various types of waste produced are described and their consumption by scavenging albatrosses is quantified. The results indicate that Black-browed Albatrosses obtain ca. 8000 tonnes of food per annum from this source, of which two-thirds is offal and the remainder whole discards. The energy content of this waste is equivalent to 4.4% of the estimated total annual energy requirements of the Falklands Black-browed Albatross population. However, as the fishery is a greater predator of finfish stocks than are the albatrosses, its long-term impact may be detrimental to these birds. (Auth. mod.)

B-52576

Bretagnolle, V., **Systematics of the soft-plumaged petrel *Pterodroma mollis* (Procellariidae): new insight from the study of vocalizations,** *Ibis,* Apr. 1995, 137(2), p.207-218, 89 refs.

Vocalizations are especially relevant in nocturnal burrowing petrels and act as behavioral isolating mechanisms. The analysis, based on 535 calls from seven of the 11 known breeding localities of the species, showed that physical parameters of the call did not overlap between breeding localities in the northern and southern hemispheres but did so within each hemisphere. Conversely, the morphological analysis, based on morphometrics from ten localities, displayed wide and significant intra-hemisphere variation, whereas there was no consistent difference between northern and southern parts of the breeding range. Thus analysis of the two sets of characters gave contradictory results. Calls, owing to their role in species-specific recognition in these birds, should be given priority over other characters for species separation. The author proposes that only two species be recognized, *Pterodroma mollis* and *Pterodroma feae,* with three subspecies each. Behavorial affinities between *P. mollis/feae* groups and other gadfly petrels show that *P. mollis/feae* were closest to *P. cahow,* whilst *P. hasitata, P. phaeopygia* and *P. externa* belong to other groups of gadfly petrels. Representatives from petrel colonies on Gough, Marion, Crozet, and the Kerguelen Islands were included in this study. (Auth. mod.)

B-52577

Lamey, C.S., **Chick loss in the Falkland skua *Catharacta skua antarctica*,** *Ibis,* Apr. 1995, 137(2), p.231-236, 37 refs.

Data on reproductive success of 110 Falkland Skua pairs were gathered during the austral summers of 1988-89 and 1990-91 on New I., Falkland Is. Adults laid two eggs 2-3 days apart and began incubation with the first egg. For the years combined, 1.39 chicks per nest hatched and 0.84 chicks per nest fledged (fledging was defined as surviving to 16 days of age). Brood reduction was common; 43% of the two-chick broods were reduced to one, and mortality was concentrated on the younger chick. Although asynchronous hatching and differential death are consistent with Lack's brood reduction hypothesis, application of O'Connor's quantitative criterion revealed that sibling competition may not be responsible for the observed chick mortality. Furthermore, because no aggressive interactions between chicks were observed or detected indirectly, siblicide may be absent in this population. Instead, predation modified by a variety of factors may have led to the greater mortality of the second-hatched chick. (Auth.)

B-52581

Kasamatsu, F., Nishiwaki, S., Ishikawa, H., **Breeding areas and southbound migrations of southern minke whales *Balaenoptera acutorostrata*,** *Marine ecology progress series,* March 23, 1995, 119(1-3), p.1-10, Refs. p.9-10.

Southern minke whales are genetically separated from Northern Hemisphere minke whales. Seasonal migrations take them from tropical latitudes in winter to high latitudes of the antarctic in summer. Breeding takes place in warmer waters. Breeding areas and southbound migrations were studied using sighting data derived from Japanese sighting surveys from 1976 to 1987. Breeding populations of the southern minke whale are relatively dispersed in open waters while coastal species, such as right whales, humpbacks and grays migrate along the shore and congregate in near-shore breeding areas. Latitudinal occurrences by month suggest that southern minke whales have moved southward from the breeding areas by Oct.-Nov., and that most of them have migrated into antarctic waters by Jan. They tend to move almost directly south from the breeding areas to feeding areas, and subsequently disperse after arriving at the feeding areas. Southbound migration speeds were estimated to average 20 nautical miles (n miles)/d in waters north of the subtropical convergence and 40 to 50 n miles/d in waters south of the convergence. (Auth. mod.)

B-52582

Pakhomov, E.A., **Demographic studies of antarctic krill *Euphausia superba* in the Cooperation and Cosmonaut seas (Indian sector of the southern ocean),** *Marine ecology progress series,* March 23, 1995, 119(1-3), p.45-61, Refs. p.59-61.

The reproductive state and size composition of *Euphausia superba* Dana collected in the Indian Ocean from 1985 to 1990 were analyzed to estimate its growth, life span and mortality rates. The life span of *E. superba* exceeded 5 yr in the Cosmonaut Sea and 6 yr in the Cooperation Sea. Assuming growth for only 180 d per year, growth rates ranged from 0.120-0.133 mm/d during the first year of life to 0.019-0.022 mm/d during the fifth year. Von Bertalanffy growth curves calculated for different areas are similar to those obtained by Australian researchers in the Prydz Bay region for 1981 to 1985. In midsummer, *E. superba* of age 2+ to 4+ were predominant in all hauls made south of the Antarctic Divergence, while north of the Divergence the krill were clearly dominated by individuals of age 4+. The coefficients of natural mortality (M) of *E. superba* in the Indian Ocean varied from 0.72 to 2.92. The value of age-dependent natural mortality of *E. superba* derived using Zikov & Slepokurov's method ranged from 0.52 during the maturation period to 1.1-2.41 during the first and last years of life. (Auth. mod.)

B-52583

Øresland, V., **Winter population structure and feeding of the chaetognath *Eukrohnia hamata* and the copepod *Euchaeta antarctica* in Gerlache Strait, Antarctic Peninsula,** *Marine ecology progress series,* March 23, 1995, 119(1-3), p.77-86, 27 refs.

Eukrohnia hamata and *Euchaeta antarctica* are dominant macrozooplankton predators in the southern ocean. Zooplankton samples were taken at 3 stations during July and Aug. 1992 in waters west of the Antarctic Peninsula. *E. hamata* constituted up to 97% of all chaetognaths by number and up to 20% of net zooplankton by wet weight. *E. hamata* breeds at a low intensity, while *E. antarctica* breeds at a high intensity during midwinter. Gut content analyses showed that *Metridia gerlachei* and the small copepods *Oncaea* spp. and *Microalanus pygmaeus* were the main prey in both species. Rough estimates of daily predation impact showed that *E. hamata* could eat up to 0.2% of prey standing stock by number. It is suggested that the accumulative predation impact during winter by *E. hamata* and other carnivorous zooplankton may be large, especially since there is little evidence of prey reproduction that could counteract such a predation impact. About 1% of the *E. hamata* population was parasitized or decapitated by a small ectoparasitic polychaete. (Auth. mod.)

B-52584

Lee, S.H., Kang, Y.C., Fuhrman, J.A., **Imperfect retention of natural bacterioplankton cells by glass fiber filters,** *Marine ecology progress series,* March 23, 1995, 119(1-3), p.285-290, 16 refs.

In this study, natural bacterioplankton cells were filtered through Whatman GF/F filters, and apparent cell size-frequency distributions were obtained by epifluorescence photomicrography before and after the filtration. Seawater samples were from a northwest Atlantic coast and from the Antarctic. Filtrate contained 35 to 43% of the total bacterial cell count, equivalent to 22 to 38% of the total bacterial biomass. Size-frequency distributions showed that cells larger than 0.8 μm diameter (volume-equivalent spherical diameter, VESD) did not pass the filters, however the filters retained substantial numbers of small (VESD<0.8 μm) bacteria. In comparisons of the different types of glass fiber filters, retention efficiency (fraction of the cells retained by a filter) ranged from ca. 13 to 51%, i.e. 49 to 87% of the natural bacterioplankton cells passed through the tested filters. (Auth. mod.)

B-52588

Delille, D., **Comparative study of effects of organic materials from terrestrial and marine sources on the growth of subantarctic marine pelagic bacteria,** *Vie et milieu,* Sep. 1994, 44(3/4), p.159-166, Refs. p.164-166.

The effects of organic material from terrestrial and marine sources on the growth of subantarctic marine pelagic bacteria was compared in 3 m^3 batch experiments. The terrestrial source was mainly made up of the subantarctic dominating rosaceous suffruticose herb *Acaena magellanica* (Lam.) Vahl. The marine sources included giant kelp *(Macrocystis pyrifera* C.A. Agardh) and zooplankton *(Drepanopus pectinatus* Brady, 1887). The bacteriological survey included total and heterotrophic counts and estimation of bacterial production by the ^3H thymidine method. The main enhancement of bacterial growth was observed after addition of dead zooplankton, but the influence of giant kelp was always significant. The absence of any measurable effect of terrestrial material suggests that in this particular subantarctic coastal area, terrestrial inputs have a rather limited influence on biogenic fluxes. (Auth.)

B-52589

Ray, M.K., Kumar, G.S., Shivaji, S., **Tyrosine phosphorylation of a cytoplasmic protein from the antarctic psychrotrophic bacterium *Pseudomonas syringae*,** *FEMS microbiology letters,* 1994, 122(1-2), p.49-54, 22 refs.

Cytoplasmic proteins from the antarctic psychrotrophic bacterium *Pseudomonas syringae* showed two phosphorylated proteins of molecular mass 66 kDa and 62 kDa. The phosphorylation of 66 kDa protein was enhanced in the presence of Triton X-100 solubilized membrane proteins at a higher temperature (30°C) only. Western blot analysis and phosphoamino acid analysis indicated that the 66 kDa protein is phosphorylated at a tyrosine residue. Surprisingly, sodium orthovanadate, which is a known phosphotyrosine phosphatase (PTPase) inhibitor, inhibited the phosphorylation of the protein. The possible importance of this tyrosine phosphorylated protein to growth at low temperature is suggested. (Auth.)

B-52590

Reddy, G.S.N., Rajagopalan, G., Shivaji, S., **Thermolabile ribonucleases from antarctic psychrotrophic bacteria: detection of the enzyme in various bacteria and purification from *Pseudomonas fluorescens*,** *FEMS microbiology letters,* 1994, 122(3), p.211-216, 23 refs.

Thirteen terrestrial psychrotrophic bacteria from Antarctica were screened for the presence of a thermolabile ribonuclease (RNAase-HL). The enzyme was detected in three isolates of *P. fluorescens* and one isolate of *Pseudomonas syringae.* It was purified from one *P. fluorescens* isolate and the molecular mass of the enzyme as determined by SDS-PAGE was 16 kDa. RNAase-HL exhibited optimum activity around 40°C at pH 7.4. It could hydrolyze *Escherichia coli* RNA and the synthetic substrates poly(A), poly(C) and poly(A-U). Unlike the crude RNAase from mesophilic *P. fluorescens* and pure bovine pancreatic RNAase A which were active even at 65°C, RNAase-HL was totally and irreversibly inactivated at 65°C. (Auth.)

B-52593

Spiridonov, V.A., **Spatial and temporal variability in reproductive timing of antarctic krill *(Euphausia superba* Dana),** *Polar biology,* 1995, 15(3), p.161-174, Refs. p.172-174.

Spawning dates of antarctic krill *Euphausia superba* were calculated from larval stage compositions and corrected using data on maturity stage composition of the adult krill. In relation to spawning timing variation, the habitats of the krill population fall into five categories: areas with an early beginning (late Nov.-early Dec.) and a variable, but normally long, duration (3-3.5 months) of krill spawning; this is generally the southern boundary of the Antarctic Circumpolar Current; areas with an early beginning, but a short duration of krill spawning (Gerlache Strait); areas with a highly variable (within 1-1.5 months) beginning and a relatively long duration (ca. 3 months) of krill spawning (Bransfield Strait, Palmer Archipelago); areas with a late beginning (late Dec.-Jan.) and a long duration of krill spawning (Bellingshausen Sea, D'Urville Sea, and Balleny Is. area); and areas with a delayed beginning, but a very short duration (ca. 1.5 months) of krill spawning (Ross Sea slope). (Auth. mod.)

B-52594

Metz, C., **Seasonal variation in the distribution and abundance of *Oithona* and *Oncaea* species (Copepoda, Crustacea) in the southeastern Weddell Sea, Antarctica,** *Polar biology,* 1995, 15(3), p.187-194, Ref. p.193-194.

The coupling between the seasonal distribution of dominant Oithonidae and Oncaeidae and the prevailing environmental conditions in the eastern Weddell Sea were investigated. In samples from Feb., a community on the shelf and in the oceanic surface layer consisting mainly of *Oithona similis* and *Oncaea curvata* and juveniles of both genera could be differentiated from a community found in deeper oceanic waters consisting of *Oithona frigida, Oncaea parila, Oncaea antarctica* and *Oncaea englishi.* In Nov. the differences in the species distribution between the two regions were less pronounced and the abundances of all species were much lower than earlier in the year. The dominant species were *O. similis,* which reached abundances of up to $182/m^3$ in Feb. and *O. curvata* with up to $215/m^3$. Deeper living species were comparatively rare. *O. similis* occurred mainly in the top 200 m during both seasons. (Auth.)

B-52595

Ward, P., Atkinson, A., Murray, A.W.A., Wood, A.G., Williams, R., Poulet, S.A., **Summer zooplankton community at South Georgia: biomass, vertical migration and grazing,** *Polar biology,* 1995, 15(3), p.195-208, Refs. p.207-208.

Zooplankton abundance and biomass were determined during Jan. 1990 at two stations to the northwest of South Georgia. At both shelf and oceanic station sites, zooplankton biomass (excluding *Euphausia superba)* was found to be ca. 13 g dry mass/m^2. Copepods and small euphausiids dominated the catches. Principal components analysis disclosed similarities and differences between adjacent depth strata in terms of abundance, biomass and species composition. At both stations, most variability occurred in the mixed layer (0-60 m) and thermocline (60-120 m) with depth horizons below this being more homogeneous. Diel migrations were observed for most taxa with abundance increasing in the mixed layer at night. At the oceanic station, species and higher taxa belonging to the mesopelagic community were generally well spread throughout this domain and, with the exception of *Pleuromamma robusta* and *Metridia curticauda,* showed little evidence of migration. (Auth. mod.)

B-52596

Cherel, Y., **Nutrient reserve storage, energetics, and food consumption during the prebreeding and premoulting foraging periods of king penguins,** *Polar biology,* 1995, 15(3), p.209-214, Refs. p.213-214.

Nutrient reserve storage during the prefasting foraging trips of king penguins was investigated by measuring body composition at the beginning and the end of the prebreeding and premoulting periods at sea. Both periods were marked by a 45-47% increase in body mass, including body water, protein and lipid, but not ash. Fat accretion accounted for most of the energy stored and was mainly located in the subdermal depot, the larger increase in body protein occurring in pectoral muscles. Daily mass gain was lower during the prebreeding foraging trip than during the premoulting one (195 versus 328 g/day), while there was no difference in the rate of energy storage (4,097 and 4,155 kJ/day). The total energy costs of the foraging periods were calculated to be 381 and 315 MJ during the prebreeding and premoulting trips respectively, which corresponded to a 70 kg and a 58 kg food intake. The consumption of marine resources by the king penguin population from Crozet Is. was estimated to be 166,000 tons in spring/summer during the two foraging periods preceding long-term fasts. (Auth.)

B-52597

Chattopadhyay, M.K., Uma Devi, K., Gopishankar, Y., Shivaji, S., **Thermolabile alkaline phosphatase from *Sphingobacterium antarcticus,* a psychrotrophic bacterium from Antarctica,** *Polar biology,* 1995, 15(3), p.215-219, 29 refs.

Eight psychrotrophic strains belonging to four different genera were screened for the presence of cold-active alkaline phosphatase in sonicated cell homogenates. An approximately 1000-fold higher activity than *E. coli* was detected in two psychrotrophic strains of *Sphingobacterium antarcticus* and one mesophilic strain of *Flavobacterium multivorum.* The enzymes from the psychrotrophs showed maximum activity at 37°C and were also found to be active at 0°C. Alkaline phosphatase from one psychrotrophic *Sphingobacterium* lost 97% of its activity when it was heated for 10 min at 62°C. This enzyme was partially purified and characterized. The production of the enzyme was repressed when the organism was grown in the presence of phosphates; its activity was inhibited on preincubation with inorganic phosphates and ethylene diamine tetracetic acid. Potassium permanganate and potassium periodiate did not inhibit the activity of the enzyme. The biotechnological importance of the enzyme is discussed. (Auth.)

B-52598

Sømme, L., Meier, T., **Cold tolerance in Tardigrada from Dronning Maud Land, Antarctica,** *Polar biology,* 1995, 15(3), p.221-224, 20 refs.

Survival at low temperatures was studied in three species of Tardigrada from Queen Maud Land. Both hydrated and dehydrated specimens of *Echiniscus jenningsi, Macrobiotus furciger* and *Diphascon chilenense* had high survival rates following exposure to -22°C for ca. 600 days, and dehydrated specimens following 3040 days at this temperature. In hydrated *E. jenningsi,* mortality increased with the duration of exposure from 7 to 150 days at -80°C, while mortalities of the two other species did not change. Hydrated specimens of all species were rapidly killed at -180°C, but all species exhibited good survivorship in the dehydrated state after 14 days at -180°C. In conclusion, hydrated tardigrades are able to survive extended periods at low temperatures, and dehydrated specimens are even better adapted to survive overwintering on antarctic nunataks. (Auth.)

B-52599

Chapelle, G., Peck, L.S., **Influence of acclimation and substratum on the metabolism of the antarctic amphipods *Waldeckia obesa* (Chevreux 1905) and *Bovallia gigantea* (Pfeffer 1888),** *Polar biology,* 1995, 15(3), p.225-232, Refs. p.231-232.

Respiration rates in the antarctic amphipods *Waldeckia obesa* (Chevreux 1905) and *Bovallia gigantea* (Pfeffer 1888) were measured in relation to the presence or absence of a substratum to attach to, and the amount of time spent in a respirometer. During the first 4 h after placing animals in respirometers, oxygen consumption in *W. obesa* was reduced by factors between 1.2 and 3.6 times by the presence of a nylon mesh net substratum. Oxygen consumption over the first 12 h after being placed in respirometers was reduced by factors of between 1.1 and 3.9 times for *B. gigantea* by the presence of pieces of corrugated plastic pipe. The effects on oxygen consumption of acclimating animals to respirometers were only assessed for *W. obesa.* Rates during the first 12 h after placing animals in chambers were 3.6 times higher than rates between 12 and 30 h after the start of trials. (Auth. mod.)

B-52602

Wharton, R.A., Jr., ed, **McMurdo Dry Valleys: a cold desert ecosystem,** Reno, Nevada, Desert Research Institute, [1993], 51p., Refs. p.43-48.

This report is derived from a workshop sponsored by the National Science Foundation and held at the Institute of Ecosystem Studies in Millbrook, New York in Oct. 1991. The workshop was divided into three discussion groups organized around the terrestrial (soil), stream, and lake ecosystems in the McMurdo Dry Valleys. This document, which is a synthesis of the group reports, is intended to serve as a planning tool for scientists, program managers, and administrators interested in research activities in the McMurdo Dry Valleys.

B-52606

Røv, N., Lorentsen, S.H., Bangjord, G., **Seabird studies at Svarthamaren, Dronning Maud Land,** *Norsk Polarinstitutt. Meddelelser,* 1994, No.124, Report of the Norwegian Antarctic Research Expedition 1991/1992. Edited by S. Østerhus, p.9-20, 14 refs.

The objectives of monitoring and research at Svarthamaren Mountain are as follows: to document long-term changes in the population dynamics of antarctic petrel and south polar skua in relation to resource availability; to examine whether the demography of the breeding populations on the continent differ from the patterns recorded in seabird populations in other parts of the region; to study ecological adaptations among antarctic petrels breeding in continental Antarctica; and to elucidate the transport routes of chlorinated hydrocarbon residues, heavy metals and trace elements through food-chains and the ultimate fate of these compounds. Some preliminary results are discussed and shown in tables.

B-52619

Healy, J.M., Schaefer, K., Haszprunar, G., **Spermatozoa and spermatogenesis in a monoplacophoran mollusc, *Laevipilina antarctica*: ultrastructure and comparison with other Mollusca,** *Marine biology,* Mar. 1995, 122(1), p.53-65, 75 refs.

Ultrastructural features of spermatozoa and spermatogenesis are described for the first time in a monoplacophoran and compared with data for other conchiferan molluscs. Spermatozoa of *Laevipilina antarctica* are of the structurally simple aquasperm type, featuring a conical acrosome, a compact nucleus with lacunae, a short midpiece and a single flagellum. The acrosomal vesicle shows an electron-dense inner zone, and a basal invagination contains granular material but no axial rod. The nucleus exhibits a shallow indentation apically which contains subacrosomal material, and five indentations posteriorly which partially accommodate the five midpiece mitochondria. Two centrioles are present, the distal connected to the annulus by satellite fibers and acting as a basal body for the flagellum. Spermatogonia, characterized by an oblong nucleus and one or two nucleoli, line the basal membrane of the testis wall; spermatids of varying stages of maturity occupy the remainder of the testis. Acrosome and flagellum production is already well advanced in spermatids and probably commences at the spermatocyte stage. Materials for this study were collected from antarctic waters by the Polarstern Expedition ANT IX/3, Station 212 at approximately 70S/4E in 1992. (Auth. mod.)

B-52626

Ridoux, V., **Diets and dietary segregation of seabirds at the subantarctic Crozet Islands,** *Marine ornithology,* 1994, 22(1), p.1-192, Refs. p.172-182.

The diets of 27 seabird species were investigated concurrently at the subantarctic Crozet Is. The species in the study include penguins (four species), albatrosses (six species), petrels (11 species), storm petrels (three species), diving petrels (two species) and cormorant (one species) which virtually represents the whole pelagic seabird community breeding on these islands. The stomach contents were collected using non-lethal methods combining spontaneous regurgitation and stomach-flushing techniques. The analytical procedure was designed to provide quantitative data on number, mass and body length distribution of every prey taxon occurring in any individual bird sample. The data are given for every bird species as occurrence, number, mass and body length of each prey type found in the fresh fraction (or food load), while accumulated diagnostic items are described separately to avoid most biases arising from differential digestion rates of these items. (Auth. mod.)

B-52627

Meyer-Rochow, V.B., Reid, W.A., **Male and female eyes of the antarctic midge *Belgica antarctica* (Diptera: Chironomidae)—a scanning electron microscope study,** *Applied entomology and zoology,* Aug. 25, 1994, 29(3), p.439-442, 17 refs.

In January 1993, 10 male and 4 female specimens of this antarctic midge were collected near the Chilean Yelcho Station. The three males examined possessed eyes having 39 and 42 facets while the females had 29 and 33. The eyes were round and strongly convex corneal lenses were developed. Intercommatidial hairs filled the spaces between the facets. Other physical aspects of the eyes were examined, discussed, and compared with previous investigations of these creatures. It is conceivable that the bright antarctic summer light, rich in ultraviolet, has firstly been responsible for the evolution of the tiny facets and secondly, in combination with the icy antarctic winds, encouraged the insect to take residence principally in the darker regions between rocks and boulders, patches of moss, and underground, thus leading to the overall diminution of the eye and its visual capacities.

B-52628

Drits, A.V., Pasternak, A.F., Kosobokova, K.N., **Physiological characteristics of the antarctic copepod *Calanoides acutis* during late summer in the Weddell Sea,** *Hydrobiologia,* Nov. 25, 1994, Vol.292/293, p.201-207, Refs. p.206-207.

Ingestion, respiration and excretion rates as well as lipid and protein body content of the dominant antarctic copepod *Calanoides acutus* (CIV to adult females) were studied during the period covering the end of phytoplankton bloom (Feb.) to the beginning of transition to overwintering (Mar.-Apr.). Daily rations measured with gut fluorescence varied from 2.2 to 2.7% in surface *C. acutus.* Weight-specific respiration and excretion rates in deep *C. acutus* decreased by factors of 11 and 3.5-3.8 compared to their surface counterparts. High lipid and protein content was observed in surface *C. acutus* CV in Feb.; a month later animals with similar lipid and protein content were found in the 500-1000 m water layer. Their lipid reserves were enough to overwinter and probably to ascend, molt and reproduce. At the same time, some of the deep CVs had much lower protein and lipid content and could survive only for 4-5 months. It is concluded that females of *C. acutus* reach adulthood at the age of more than one year, while development of males could be completed in one year. (Auth.)

B-52629

Kosobokova, K.N., **Reproduction of the calanoid copepod *Calanus propinquus* in the southern Weddell Sea, Antarctica: observations in laboratory,** *Hydrobiologia,* Nov. 25, 1994, Vol.292/293, p.219-227, Refs. p.226-227.

Reproduction of the dominant antarctic copepod *Calanus propinquus* was studied in Feb.-Apr. 1989 aboard the R.V. *Dmitry Mendeleev* during a cruise in the Weddell Sea. Single females were kept at 0°C in the laboratory for 56 days with abundant food. Females released clutches at night at 2-3 day intervals. Most clutches contained from 10 to 40 eggs, at a mean 37.3 eggs/female. Average carbon content of an egg was 0.37 µg C. The maximum daily egg production rate of 30-50 eggs/female/d was observed for the first 3 days of the laboratory incubation, corresponding to 3.7-6.2% body C. The state of gonadal development of females showed a decline of the reproductive season in late Feb. The data suggest that egg laying in the region under study starts in Dec. and lasts until Mar. The state of ovarian maturation, changes in vertical distribution and biochemical body composition of females suggest the possibility of a two-year cycle in *C. propinquus* in the southern Weddell Sea. (Auth.)

B-52631

Arduino, P., et al, **Isozyme variation and taxonomic rank of *Contracaecum radiatum* (v. Linstow, 1907) from the antarctic ocean (Nematoda, Ascaridoidea),** *Systematic parasitology,* Jan. 1995, 30(1), p.1-9, 25 refs.

Genetic variation of the antarctic anisakid *Contracaecum radiatum* from the Ross and Weddell Seas is studied at 24 enzyme loci. All polymorphic loci proved to be in Hardy-Weinberg equilibrium, with no significant differences among the samples tested. Several loci were found to be diagnostic between *C. radiatum* and the 5 known members of the *C. osculatum* complex, indicating that no gene exchange occurs between them and confirming their specific status. No F_1 hybrids, recombinant or introgressed individuals sharing *radiatum* and *osculatum* alleles were detected in the antarctic *Contracaecum* samples; this directly proves the reproductive isolation of *C. radiatum.* Biochemical keys are given for the identification of antarctic *C. osculatum* members, possibly related to a lower degree of habitat disturbance (i.e., by pollution, fishing and hunting) in the antarctic region. (Auth. mod.)

B-52643

Zhou, M., Nordhausen, W., Huntley, M., **ADCP measurements of the distribution and abundance of euphausiids near the Antarctic Peninsula in winter,** *Deep-sea research, Part I,* Sep. 1994, 41(9), p.1425-1445, 44 refs.

Euphausiid populations were observed in Gerlache Strait during austral winter 1992 using a hull-mounted 153-kHz acoustic Doppler current profiler and a multiple opening and closing net and environmental sensing system (MOCNESS). Theoretical estimates of target strength yielded estimates of mean volume backscattering strength (MVBS) that compared favorably with observed values at low abundances. However, net samples underestimated biomass by almost two orders of magnitude at high abundances, a feature attributed to net avoidance. Other taxonomic groups of macrozooplankton did not appear to contribute significantly to acoustic backscatter. Distributions of euphausiids were similar to those observed in summer; the authors found no evidence for abundant aggregations immediately below surface sea-ice. Krill dominated the biomass at all stations; details of size-depth ratios and biomass are discussed. (Auth. mod.)

B-52644

Sims, P.A., ***Benetorus, Gladiopsis* and related genera from the Cretaceous,** *Diatom research,* 1994, 9(1), p.165-187, 27 refs.

Seymour Island algal species hitherto identified as *Pomphodiscus morenoensis* (Long, Fuge & Smith) Barker & Meakin *(Craspedodiscus morenoensis* Long, Fuge & Smith) and *Coscinodiscus morenoensis* var. *sensu* Long, Fuge & Smith are transferred to the genus *Benetorus* Hanna; *C. morenoensis* Hanna is assigned to a new genus *Azpeitiopsis.* It has recently been suggested that the above species may be related to *Gladius antarcticus* Harwood. This investigation proves that they are not so related but belong to two different families, Benetoraceae, *fam. nov.* and Thalassiosiropsidaceae Nikolaev. (Auth.)

B-52656

Stevens, J.E., **Antarctic pack-ice ecosystem,** *BioScience,* Mar. 1995, 45(3), p.128-132.

Cruises into the pack ice of the Weddell Sea in the winters of 1986 and 1992, and into the pack ice of the Amundsen and Ross seas in the winter of 1994, found that algae live and grow in pockets of meltwater, in brine channels, and at the snow ice interface, throughout the ice all winter. Previously it was thought that algae lived only on the bottom surface of the ice and that krill dropped to the sea floor and hibernated during the winter. The evidence now indicates that adult and larval krill graze on the ice algae through the winter, so that in effect the pack ice is a krill nursery.

B-52678

Cocca, E., et al, **Genomic remnants of α-globin genes in the hemoglobinless antarctic icefishes,** *National Academy of Sciences of the United States of America. Proceedings,* Mar. 14, 1995, 92(6), p.1817-1821, 35 refs.

Alone among piscine taxa, the antarctic icefishes have evolved compensatory adaptations that maintain normal metabolic functions in the absence of erythroxytes and the respiratory oxygen transporter hemoglobin. Although the uniquely "colorless" or "white" condition of the blood of icefishes has been recognized since the early 20th century, the status of globin genes in the icefish genomes has, surprisingly, remained unexplored. Using α- and β-globin cDNAs from the antarctic rockcod, the authors probed the genomes of three white-blooded icefishes and four red-blooded notothenioid relatives (three antarctic, one temperate) for globin-related DNA sequences. The probe showed specific, high-stringency hybridization of the α-globin probe to genomic DNAs of both white- and red-blooded species, whereas the β-globin cDNA hybridizes only to the genomes of the red-blooded fishes. These results suggest that icefishes retain inactive genomic remnants of α-globin genes but have lost, either through deletion or through rapid mutation, the gene that encodes β-globin. It is proposed that the hemoglobinless phenotype of extant icefishes is the result of deletion of the single adult β-globin locus prior to the diversification of the clade. (Auth. mod.)

B-52679

Lahdes, E., **Acute thermal tolerance of two antarctic copepods, *Calanoides acutus* and *Calanus propinquus*,** *Journal of thermal biology,* Feb.-May 1995, 20(1/2), p.75-78, 26 refs.

The thermal tolerance of antarctic copepod species *Calanoides acutus* and *Calanus propinquus* was tested with a short-term exposure (15 min) at three constant temperatures of 14, 16 and 18°C and after 12-h exposure at three constant temperatures of 14, 15 and 16°C. Lethal temperatures (LT_{50}) after an exposure time of 15 min and a recovery time of 30 min were 18.1°C for *C. acutus* and 16.1°C for *C. propinquus.* In 12 h exposure LT_{50} for *C. acutus* was 14.3°C. The results give support to some recent observations that at least in short-term exposure, antarctic copepods exhibit a higher tolerance for elevated temperatures than suggested before for antarctic marine poikilotherms. (Auth.)

B-52683

Oehme, M., Schlabach, M., Boyd, I.L., **Polychlorinated dibenzo-p-dioxins, dibenzofurans and coplanar biphenyls in antarctic fur seal blubber,** *Ambio,* Feb. 1995, 24(1), p.41-46, 33

refs.

Levels of polychlorinated dibenzo-p-dioxins (PCDD) and dibenzofurans (PCDF) as well as of coplanar (non-ortho substituted) polychlorinated biphenyls (CB-77, CB-126 and CB-169) have been determined in 11 fur-seal blubber samples from female antarctic fur seals. Measurable PCDD/PCDF concentrations averaging 2 ppt TEQ (Nordic model) were found. This is considerably less than in arctic seals. In addition, the PCDD/PCDF congener patterns differed between antarctic and arctic seals. The levels of CB-77, CB-126 and CB-169 (8.5-41 pg/g for single congeners on average) in antarctic fur seals were also much lower than in arctic ringed and harp seals. A possible explanation of these differences is the overall lower environmental pollution of the Southern Hemisphere, although the influence of different age and sex distributions cannot be excluded. (Auth. mod.)

B-52698

Voronina, N.M., Levin, L.A., Zadorina, L.A., Sazhin, A.F., **Planktonic community in the Pacific sector of the Antarctic in February-March 1992,** *Oceanology,* June 1994, 33(6), p.778-784, Translated from Okeanologiia. 24 refs.

This paper is based on material from 19 stations obtained during the 6th cruise of R/V *Akademik Ioffe* in Feb.-Mar. 1992 along a transect from Adelaide I. to the Pennella Coast and northeast of the Balleny Is. Distribution of some integral estimates of plankton abundance is considered. Quantitative variations of seston and chlorophyll were similar; they did not depend on alternations of the antarctic water modifications, but were caused by regional and temporal factors. Areas of abundance are presumably related to local upwellings, and poor areas are related to grazing down by salps and to the pre-spring seasonal condition of the community. The east-to-west successive changes of the vertical profiles of seston recorded along the route were a reflection of phase alternations of the annual cycle of plankton. (Auth. mod.)

B-52719

Cochlan, W.P., Martinez, J., Holm-Hansen, O., **RACER: Utilization of nitrate, ammonium, and urea during austral winter in Gerlache Strait, Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.169-172, 20 refs.

As part of the phytoplankton component of the RACER program, the authors measured nitrogen (NO_3^-, NH_4^+, and urea) uptake by natural planktonic communities within the euphotic zone of the coastal waters of the Gerlache Strait during the austral winter of 1992. They present here preliminary information on the uptake rates of new and regenerated nitrogen in the RACER area.

B-52720

Cochlan, W.P., Martinez, J., Holm-Hansen, O., **RACER: Primary production in Gerlache Strait, Antarctica, during austral winter,** *Antarctic journal of the United States,* 1993, 28(5), p.172-174, 7 refs.

The concentration of chlorophyll-*a* in the surface waters throughout the RACER fast grid of Gerlache Strait was uniformly very low (0.03-0.07 mg/l). No subsurface chlorophyll maxima were observed during the July-Aug., 1992 period of study. Integrated values of chlorophyll-*a* throughout the euphotic zone (0-75 m) were less than 5 mg/m^2, suggesting very little phytoplankton biomass at this time. Rates of primary productivity were also very low, with maximal values generally in the upper 30 m of the water column.

B-52721

Brinton, E., **RACER: *Euphausia superba* in Gerlache Strait, Antarctica, springs of 1989 and 1991,** *Antarctic journal of the United States,* 1993, 28(5), p.174-176, 5 refs.

The four surveys of Gerlache Strait during the onset of the spring bloom in Nov. 1989 (RACER II) and the three in Dec. 1991 (RACER III) provided evidence of maturing *Euphausia superba* in the Gerlache Strait. Largest specimens from the Nov. 1989 cruises were 33-40 mm and showed gonadal development but with ovaries and male petasmas still in early adolescence. Most of these krill, together with the much more numerous juvenile krill without secondary sexual characteristics, were in the northern Gerlache Strait. Small numbers of still larger adult krill (to 53 mm) were present in Dec. 1991. The striking interannual differences in body sizes of the predominating juvenile krill in Gerlache Strait, presumed to be year-1 krill, seem likely to have been due either to differences in environmental circumstances affecting timing of their respective recruitments a year earlier or to differences in winter growth.

B-52722

Loeb, V.J., **RACER: Ichthyoplankton abundance, species composition, and distribution in Gerlache Strait, Antarctica, October to November 1989,** *Antarctic journal of the United States,* 1993, 28(5), p.177-179, 12 refs.

A detailed study in Gerlache Strait during 1989 by the RACER program makes it possible to examine the importance of coastal environments to larval fish, including aspects of abundance, composition, and retention in nearshore waters. Only one of the 103 tows did not contain larval fish; the other tows had between 2 and 88 larvae and yielded a total of 1,578 larvae. The overall averaged abundance of 19.0 larvae per 10 m^2 is similar to that found in the northern Gerlache Strait during the Dec. 1986 RACER cruise. Nineteen larval fish taxa were represented in the collections.

B-52723

Laman, E.A., Loeb, V.J., **RACER: Larval feeding ecology of three species of antarctic fishes *(Lepidonotothen larseni, Trematomus newnesi,* and *T. lepidorhinus)* from Gerlache Strait, Antarctica, November 1989,** *Antarctic journal of the United States,* 1993, 28(5), p.179-180, 7 refs.

The authors present the preliminary results from feeding studies on larval fishes collected in Gerlache Strait during Nov. 1989 by the RACER program. During this program, vertically stratified MOCNESS tows were made at stations arranged in a grid pattern across a 4,000 km^2 survey area. The feeding studies concentrate on 3 numerically dominant species in the samples: *Lepidonotothen larseni, Trematomus newnesi,* and *T. lepidorninus.* In addition to conventional feeding-habit analysis, which involves recording feeding incidence and prey identification, number, and volume, the studies include aspects of larval fish nutritional condition and the ecological role of yolk reserves.

B-52724

Rosenberg, J.E., Hewitt, R.P., Holt, R.S., **U.S. Antarctic Marine Living Resources (AMLR) program: 1992-1993 field season activities,** *Antarctic journal of the United States,* 1993, 28(5), p.181-182.

The AMLR program monitors finfish and krill fisheries, projects sustainable yields where possible, and formulates management advice and options. In addition, the program conducts field research with the long-term objective of describing the functional relationships between krill, their environment, and their predators. A field team occupied the seasonal field camp on Seal Is. from Dec. 4, 1992 to Mar. 10, 1993. The team conducted extensive research on the reproductive and feeding behaviors of antarctic fur seals, chinstrap penguins, and macaroni penguins breeding on the island. Field work at Palmer Station was initiated on Oct. 6, 1992 and completed on Apr. 1, 1993; studies on aspects of the ecology of Adélie penguins were also conducted.

B-52725

Hewitt, R.P., Demer, D.A., **AMLR program: Distribution and abundance of krill around Elephant Island, Antarctica, in the 1993 austral summer,** *Antarctic journal of the United States,* 1993, 28(5), p.183-185, 8 refs.

One of the principal goals of the Antarctic Marine Living Resources (AMLR) program is to relate the feeding ecology and reproductive success of krill predators to aspects of the prey field. Bioacoustic methodology was used to map the distribution of krill and to estimate biomass. During the 1993 field season, two large-area surveys (Surveys A and E) and four small-area surveys (Surveys B, C, D, and F) were conducted in the vicinity of Elephant I. between mid-Jan. and mid-Mar. Distribution and abundance results from these surveys are presented.

B-52726

Loeb, V., Siegel, V., **AMLR program: Krill and macrozooplankton in the Elephant Island area, January to March 1993,** *Antarctic journal of the United States,* 1993, 28(5), p.185-188, 5

refs.

Net sampling operations during the AMLR 1993 field season provided information on krill stock structure and the distribution and abundance of other macrozooplankton components in the Elephant I. area. Forty-three macrozooplankton species were identified during a survey. Salps *(Salpa thompsoni)* were present in all samples and were the overall dominant macrozooplankton. The maximum catch was 47 L with an estimated abundance of more than 16,000 salps per 1,000 m^3. The largest salp concentrations occurred in the eastern portion of the study area. The euphausiid *Thysanoessa macrura* was the second most abundant species. It was present in 92% of the tows and had a median abundance of 30 per 1,000 m^3. Krill was third in overall abundance. Two other relatively abundant and frequently occurring species were the amphipod *Vibilia antarctica* and the euphausiid *Euphausia frigida.*

B-52728

Holm-Hansen, O., Villafañe, V.E., Helbling, E.W., Sala, L., **AMLR program: Rates of primary production around Elephant Island, Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.191-193, 6 refs.

The authors report the daily rate of primary production in the AMLR study area and discuss various factors that influence rates of phytoplankton photosynthesis. Rates of photosynthesis as a function of mean irradiance during the incubation period are shown in a figure. The photosynthesis-irradiance parameters were calculated by the equation of Platt and Jassby (1976). There were no significant differences in photosynthetic response between samples from Leg I as compared with Leg II. The assimilation numbers are fairly high (2 to 4) at saturating light levels and show no significant inhibition at the highest irradiance values.

B-52729

Villafañe, V.E., Holm-Hansen, O., Helbling, E.W., Rivera, S.G., **AMLR program: Distribution of phytoplankton biomass around Elephant Island, Antarctica, January to March 1993,** *Antarctic journal of the United States,* 1993, 28(5), p.193-196, 11 refs.

Phytoplankton biomass was estimated by 3 different methods: determination of chlorophyll-*a* concentrations; direct microscopic counts with cell measurements and subsequent calculation of cellular organic carbon; and estimation of particulate organic carbon (POC) from beam-attenuation coefficients measured with a transmissometer. The highest chlorophyll-*a* values (3.5 mg chl-a/m^3) were found over the shelf slope (1,000 to 3,000 m) in the northeast corner of the survey grid. The nanoplankton fraction was relatively high (more than 65%) during both Leg I and Leg II and at all depths, except for low values ranging from 40 to 60% at some stations at 100 m in Drake Passage waters. Preliminary analyses of the net samples show the predominance of diatoms at all stations, with *Rhizosolenia antennata* f. *semispina* being characteristic in water mass I and *Corethron criophilum* in water masses II and III. The same pattern of species distribution was observed during both legs.

B-52730

Silva S., N., Hormázabal F., S., Helbling, E.W., Holm-Hansen, O., **AMLR program: Inorganic nutrient concentrations in near-surface waters around Elephant Island, Antarctica, January to March 1993,** *Antarctic journal of the United States,* 1993, 28(5), p.196-198, 9 refs.

The AMLR program is a multidisciplinary study designed to investigate the interrelationships between antarctic krill and physical-biological factors in the area around Elephant I. As one component of this program, the phytoplankton group has been analyzing the major inorganic nutrient concentrations in waters surrounding Elephant I. In this article, the authors present the distribution of major nutrients (nitrate, phosphate, and silicic acid) at 5 m within the AMLR study area.

B-52731

Veit, R.R., et al, **AMLR program: Foraging behavior and spatial pattern of pelagic birds at sea,** *Antarctic journal of the United States,* 1993, 28(5), p.198-200, 6 refs.

The aim during AMLR 1993 was to assess the spatial association at sea between seabirds and swarms of krill and to quantify the birds' foraging behavior to determine whether changes in bird behavior might provide a reliable cue to the location of krill swarms. To assess spatial association between krill and krill predators, the authors focused their analyses on the numerically dominant species of the Elephant I. area that are known to feed substantially upon krill: chinstrap penguins and antarctic fulmars. At the scale of the whole survey (10s to 100s of km), aggregations of chinstrap penguins coincided with aggregations of krill, whereas aggregations of antarctic fulmars did not.

B-52732

Bengtson, J.L., Jansen, J.K., Meyer, W.R., Miller, R.V., Schwartz, M.K., Walker, B.R., **AMLR program: Fur seal and seabird studies at Seal Island, South Shetland Islands, during the 1992-1993 austral summer,** *Antarctic journal of the United States,* 1993, 28(5), p.200-201.

Studies are conducted annually at the NOAA field camp at Seal I. For the field study of antarctic fur seals, growth rates of fur seal pups were measured by weighing pups at intervals of approximately 2 weeks between Dec. 30, 1992 and Feb. 25, 1993. Lactating females' attendance on the rookery beach was monitored continuously for 40 females, using radio transmitters and an automated radio reception/data-logging system. For the 21 females that completed 6 trips to sea without losing their pups, the average foraging-trip duration was 107.2 hours. At least 306 fur seal pups were born on Seal I. during the 1992-93 season, a small increase (5%) over the previous season. For the field study of seabirds, a total of 21,717 chinstrap penguin nests was counted during an island-wide census of Seal I. at the beginning of the field season, a level close (4% less) to that observed during the previous season. The island's breeding population of macaroni penguins (266 nests) was slightly larger (5%) than the previous year. The breeding success of cape petrels at Seal I. in 1992-93 (0.90 chicks per active nest) was intermediate between values for the two previous seasons.

B-52734

Quetin, L.B., Ross, R.M., Baker, K., **Palmer long-term ecological research (LTER): An overview of the 1992-1993 season,** *Antarctic journal of the United States,* 1993, 28(5), p.205-208, 5 refs.

During U.S. Antarctic Program 1992-93 (USAP 92-93), the Palmer LTER staged three major research efforts: the nearshore sampling program in the spring and summer, the annual summer cruise on the R/V *Polar Duke* (Jan. 1 to Feb. 7, 1993), and an austral autumn process cruise on the R/V *Nathaniel B. Palmer* (Mar. 25 to May 15, 1993). The original five components were joined by a microbial loop component during both research cruises. The annual cruise is reviewed as a time-series cruise with complementary research on processes important to ecosystem functioning. The LTER Jan. 1993 cruise was divided into 3 phases. The objective of phases I and III was to document mesoscale variability in the ecosystem and its functions. Station work included sampling for hydrographic and optical characteristics of the water column, dissolved inorganic and organic carbon levels, microbial loop activity, phytoplankton biomass, photosynthetic potential and community composition, macronutrients, and distribution, abundance, and physiological condition of selected secondary producers, particularly antarctic krill and antarctic silverfish. Phase II was designed to investigate interactions between seabirds nesting near Palmer Station and the marine ecosystem within their foraging range, and coincided with a critical period for reproductive success in the Adélie penguins.

B-52736

Lascara, C.M., Hofmann, E.E., Ross, R.M., Quetin, L.B., **Palmer LTER: Overview of krill acoustic studies and results from the Antarctic Peninsula grid,** *Antarctic journal of the United States,* 1993, 28(5), p.212-214, 8 refs.

This overview describes methods of collection and postprocessing of acoustical measurements and presents preliminary results from the 1993 field season west of the Antarctic Peninsula. Replicate acoustic tows (two to three) are made over short distances (1-2 km) centered on each grid station and are concurrent with zooplankton or nekton net tows. This approach provides acoustic sampling that is coincident with other data collected at the stations, e.g. hydrographic and primary production measurements, and allows local and regional variability in krill biomass and distribution to be correlated with other habitat characteristics. During the

1993 field season, two cruises were conducted within the Antarctic Peninsula grid. Over 1,500 swarms were identified from 98 acoustic tows, totaling 150 linear km.

B-52737

Lascara, C.M., Quetin, L.B., Ross, R.M., **Palmer LTER: Krill distribution and biomass within coastal waters near Palmer Station,** *Antarctic journal of the United States,* 1993, 28(5), p.214-217, 5 refs.

This article focuses on the acoustically derived krill distribution obtained from 6 km acoustic tows using a downward-looking 120 kHz dual-beam transducer. Zooplankton net samples provided verification that krill were the dominant acoustic scatterers. Echo-integration data were postprocessed as described in Lascara et al. (this issue).

B-52738

Haberman, K.L., Ross, R.M., Quetin, L.B., **Palmer LTER: Grazing by the antarctic krill *Euphausia superba* on *Nitschia* sp. and *Phaeocystis* sp. monocultures,** *Antarctic journal of the United States,* 1993, 28(5), p.217-219, 8 refs.

Between Jan. and Mar. 1993, ingestion rates on *Nitzschia* sp. and *Phaeocystis* sp. by subadult and immature krill between 25 and 35 mm total length were quantified in the laboratory. Krill were collected in the Palmer nearshore area using a 500 μm mesh ring net deployed from a Zodiac. Experiments were conducted in parallel on *Phaeocystis* sp. and *Nitzschia* sp. Initial chlorophyll-*a* concentrations were approximately equal; krill were from the same net tow and holding aquarium. The experiments described here are preliminary in nature, but suggest that the physiological state of *Phaeocystis* sp. affects its usefulness to antarctic krill. The importance of *Phaeocystis* sp. in the antarctic phytoplankton community emphasizes the need for further investigations of it as a possible food source for antarctic krill.

B-52740

Christian, J.R., Karl, D.M., **Palmer LTER: Bacterial exoprotease activity in the Antarctic Peninsula region during austral autumn 1993,** *Antarctic journal of the United States,* 1993, 28(5), p.221-222, 4 refs.

Extensive *in vivo* measurements of exoprotease (leucine aminopeptidase, or LAPase) activity of antarctic marine bacterioplankton were made in the austral autumn 1993 LTER cruise of the R/V *Nathaniel B. Palmer.* Onshore-offshore gradients are largely absent. Several lines show regions of elevated activity that may correspond to frontal zones, but in general, activities are as great in the offshore waters of the Antarctic Circumpolar Current as in Bransfield Strait and near the coastal islands of the Palmer Archipelago. Activities are typically fairly constant from the surface to a depth of 80-120 m, where they decline sharply. The absence of a strong onshore-offshore gradient has significant implications for the remineralization of organic matter in the southern oceans. The rate of enzymatic hydrolysis *in situ* is controlled by the rate of supply of suitable substrate. If turnover rates are high, there will be little horizontal advection of phytoplankton-derived detritus. If turnover rates of dissolved peptides and proteins are low, however, as might be expected in a permanently cold environment, production and consumption of dissolved organic matter may be uncoupled in time and space, and attempts to "close the loop" and balance photosynthesis and respiration must integrate over fairly large space and time scales.

B-52745

Karl, D.M., Resing, J., **Palmer LTER: Hydrogen peroxide in the Palmer LTER region. IV. Photochemical interactions with dissolved organic matter,** *Antarctic journal of the United States,* 1993, 28(5), p.231-234, 8 refs.

Based on the hypothesis that UV radiation might play a role in microheterotrophic microbial processes by direct interactions with DOM (dissolved organic matter), several experiments were conducted to evaluate the effects of light on H_2O_2 production during shipboard and *in situ* incubations of identical solutions in both quartz and pyrex glass containers. The authors conclude that they have documented important photochemical-DOM interactions in coastal habitats of the Antarctic Peninsula. Future studies need to focus on the composition and fate of these altered DOM compounds and to quantify the role of organic matter photolysis as an important ecological variable in southern ocean ecosystems.

B-52746

Bird, D.F., Maranger, R., Karl, D.M., **Palmer LTER: Aquatic virus abundances near the Antarctic Peninsula,** *Antarctic journal of the United States,* 1993, 28(5), p.234-235, 12 refs.

Viral and bacterial abundances are shown for a profile at Paradise Harbor (Nov. 17, 1992). Bacterial abundances decreased slightly with depth. Bacteriophages were present at from 0.7 to 6 times the abundance of bacteria. The virus-to-bacteria ratio was especially low in the upper 5 m of the water column where viral abundance was minimal. It is suggested that the decline in virus-like particles in the surface waters could be the result of lower production rates, or to higher loss rates, or both.

B-52749

Pond, D.W., Priddle, J., Sargent, J.R., Watkins, J.L., **Laboratory studies of assimilation and egestion of algal lipid by antarctic krill—methods and initial results,** *Journal of experimental marine biology and ecology,* Apr. 28, 1995, 187(2), p.253-268, 35 refs.

Immature antarctic krill (length 44-48 mm) which had been maintained in an aquarium were fed dense suspensions of algal culture, either the haptophyte *Isochrysis* or the diatom *Thalassiosira.* Following acclimation to this regime, the animals were transferred to identical supplies of the same algal food, pre-labelled with ^{14}C bicarbonate for 16 h. Faecal pellets were collected individually in each experiment. Fitting a first-order kinetic model to the time-course of appearance of radio-label in faecal pellets, the authors showed that gut turnover (mean residence time of material in the gut) was rapid for krill fed on *Isochrysis* (turnover time=47 min) whilst krill took longer to process *Thalassiosira* (turnover time=256 min). Overall, the study indicates the importance of constructing detailed budgets in understanding the character and dynamics of feeding by zooplankton and suggests that control of grazing by quality as well as quantity of the food supply may be a crucial aspect of understanding ocean carbon cycling.

B-52771

Hatfield, E.M.C., Rodhouse, P.G., **Distribution and abundance of juvenile *Loligo gahi* in Falkland Island waters,** *Marine biology,* Dec. 1994, 121(2), p.267-272, 25 refs.

Four research surveys of Falkland I. waters were carried out to determine the distribution and abundance of the early life-history stages of the squid *Loligo gahi* (d'Orbigny, 1835) in the austral winter of 1988 and the austral springs of 1990, 1991 and 1992. Juveniles were caught during three of the four surveys in both Bongo nets and an RMT8 net. In each case, greatest numbers were consistently caught in waters of ≤100 m to the south and east of East Falkland. The use of an opening/closing net in 1992 showed that most *L. gahi* juveniles aggregate close to the sea floor and are more available to the sampling gear by night than by day. Limited temperature data for the 1991 and 1992 surveys suggest that distribution on the coastal shelf may be associated with water-column structure. In 1992 when temperature data implied a mixed water column, juveniles were caught in deeper water than in 1991 when the water column was stratified. The results suggest that the spawning grounds of *L. gahi* are probably situated to the south and east of the Falkland Is., at least for squid hatched in the austral winter/spring. (Auth.)

B-52773

Schroeter, B., ***In situ* photosynthetic differentiation of the green algal and the cyanobacterial photobiont in the crustose lichen *Placopsis contortuplicata*,** *Oecologia,* July 1994, 98(2), p.212-220, 37 refs.

Measurements of the photochemical efficiency of PS II, Fv/Fm, reveal that in the dry lichen thallus photosynthetic activity could be induced in the green algal photobiont by water vapor uptake in the cyanobacterial photobiont only if it was hydrated with liquid water. However, rates of apparent electron flow through PS II as well as rates of CO_2 gas exchange were suboptimal after hydration with water vapor alone and maximum rates could only be observed when the thallus was saturated with liquid water. The differences in the water-related photosynthetic performance and different light response curves of apparent electron transport rate through PS II indicate that the two photobionts act highly independently of each other. It was shown that the cyanobacteria from the cephalodia in *P. contortuplicata* act as photobiont. No evidence of photoinhibition could be found in either photobiont. (Auth. mod.)

B-52774

Árnason, Ú., Bodin, K., Gullberg, K., Ledje, C., Mouchaty, S., **Molecular view of pinniped relationships with particular emphasis on the true seals,** *Journal of molecular evolution,* Jan. 1995, 40(1), p.78-85, 48 refs.

Phylogenetic analysis of conservative nucleotide substitutions in 18 complete sequences of the mitochondrial cytochrome b gene of Phocidae (true seals), Odobenidae (walruses), and Otariidae (sea lions and fur seals), plus three ursid and three felid sequences, identified the pinnipeds as monophyletic with Otariidae and Odobenidae on a common evolutionary branch. Analysis of total nucleotide differences separated the evolutionary lineages of northern and southern phocids. Both lineages are distinct from the most ancestral phocid genus, *Monachus* (monk seals), represented by the Hawaiian monk seal. The inclusion of the Hawaiian monk seal in the subfamily Monachinae makes the subfamily paraphyletic. Among the southern phocids the close molecular relationship of the Weddell and leopard seals relative to their morphological distinction exemplifies rapid adaptation to different ecological niches. This result stands in contrast to the limited morphological differentiation relative to the pronounced molecular distinctions that may occur within the *Phoca* complex. (Auth. mod.)

B-52775

Chisholm, J.R.S., Smith, V.J., **Comparison of antibacterial activity in the hemocytes of different crustacean species,** *Comparative biochemistry and physiology,* Jan. 1995, 110A(1), p.39-45, 16 refs.

Antibacterial activity in hemocytes of the squat lobster *Galathea strigosa,* the Norway lobster *Nephrops norvegicus,* the common shrimp *Crangon crangon,* and the giant antarctic isopod *Glyptonotus antarcticus* was investigated *in vitro.* For all species, the marine bacterium *Psychrobacter immobilis* was used as the test organism, although with *G. antarcticus,* the Gram positive bacteria *Planococcus citreus* and BS 68 (an isolate from antarctic waters) were also used. Hemocyte lysate supernatants (HLS) from all four species reduced the viable count of test bacteria over a period of 4 hr, showing that their hemocytes contain factors able to neutralize bacteria *in vitro.* However, comparison of responses produced by serially diluted samples of HLS from *G. strigosa, N. norvegicus* and *C. crangon* revealed that activity (per unit protein) is weaker than for *Carcinus maenas.* (Auth. mod.)

B-52777

McClintock, J.B., et al, **Chemical defense of common antarctic shallow-water nudibranch *Tritoniella belli* Eliot (Mollusca: Tritonidae) and its prey, *Clavularia frankliniana* Rouel (Cnidaria: Octocorallia),** *Journal of chemical ecology,* Dec. 1994, 20(12), p.3361-3372, 49 refs.

Extracts of the dorid nudibranch *Tritoniella belli* and stoloniferan coral *Clavularia frankliniana* were chromatographed and analyzed by ^1H NMR and thin-layer chromatography. Three glycerol ethers were detected in *T. belli,* primarily 1-O-hexadecyl glycerol (chimyl alcohol). Chimyl alcohol was also detected after gradient flash chromatography and reverse-phase HPLC purification in the tissues of *C. frankliniana.* The common omnivorous predatory antarctic sea star *Odontaster validus,* a likely predator of benthic invertebrates, showed feeding deterrence to small cubes of *T. belli* mantle tissue placed on the tube feet along the ambulacral feeding groove, while always extruding the cardiac stomach when presented with cubes of shrimp tissue of similar size. Filter-paper disks soaked in an aqueous shrimp solution and then dried elicited a broad range of feeding behaviors in *O. validus,* including movement of the shrimp disk to the mouth, extrusion of the cardiac stomach, and the assumption of a humped feeding posture. Chimyl alcohol-treated shrimp disks caused significant feeding deterrence in sea stars when compared with control disks (solvent plus shrimp treated disks alone). (Auth. mod.)

B-52779

Focardi, S., et al, **Induction of MFO activity in the antarctic fish *Pagothenia bernacchii*: preliminary results,** *Marine environmental research,* 1995, 39(1-4), p.97-100, 9 refs.

The aim of this study was to determine the detoxification capacity and the sensitivity to pollutants of fish living in a pristine environment such as the antarctic ocean. Forty specimens of *Pagothenia bernacchii* collected during the austral summer of 1991-92 were divided into three groups and treated with 10 mg/kg of $B(\alpha)P$, 50 mg/kg of PCBs and corn oil and sacrificed after 2, 4 and 10 days. The mixed function oxidase activity measured in these fish through the test of BPMO, EROD and BROD activities revealed that both $B(\alpha)P$ and PCBs are effective in inducing this enzyme system. Owing to the slow metabolic rate of this species, related to the low ambient temperature of its natural habitat, the highest level of induction was monitored after 10 days, i.e. much later than in fish of temperate seas. (Auth. mod.)

B-52780

McKnight, D.M., Andrews, E.D., Spaulding, S.A., Aiken, G.R., **Aquatic fulvic acids in algal-rich antarctic ponds,** *Limnology and oceanography,* Dec. 1994, 39(8), p.1972-1979, 16 refs.

Fulvic acids from two antarctic coastal ponds were isolated by means of preparative scale column chromatography with XAD-8 resin. Both ponds are on Ross I. Pony Lake at Cape Royds has abundant phytoplankton populations, and Feather Pond at Cape Bird has a luxuriant benthic algal mat. Neither site has higher plants in the watershed. The dissolved organic carbon (DOC) concentration in Pony Lake was very high, but the percentage of DOC accounted for by fulvic acid was low, as has been observed for other lakes with algal-derived DOC sources. Fulvic acid from Pony Lake was more enriched in nitrogen than fulvic acid from Feather Pond, with C:N atomic ratios of 13 in Pony Lake and 24 in Feather Pond. The $[^{13}C]$NMR spectra for the coastal pond samples showed that the content of sp^2-hybridized carbon atoms (aromatic or olefinic) was only 16.5% of the total spectral area for Pony Lake and only 20.1% for Feather Pond. (Auth. mod.)

B-52781

Helbling, E.W., Villafañe, V.E., Holm-Hansen, O., **Variability of phytoplankton distribution and primary production around Elephant Island, Antarctica, during 1990-1993,** *Polar biology,* Apr. 1995, 15(4), p.233-246, Refs p.244-246.

The distribution and abundance of phytoplankton around Elephant I. were determined from early Jan. to mid-Mar. of 4 successive years, 1990-93. The number of stations where physical-optical-biological data were obtained from the surface to a maximum of 750 m ranged from 74 in 1990 to 206 in 1993. Contour maps of chlorophyll-*a* (chl-*a*) concentrations showed marked mesoscale patchiness that varied from month to month and also interannually. The distribution patterns for chl-*a* were similar when plotting surface concentrations or integrated values to 100 m. Three major zones could be distinguished that differed in both physical and biological characteristics. Stations in the northwest portion of the grid (Drake Passage waters) and in the southeast portion (Bransfield Strait waters) showed the most pronounced interannual variations, with phytoplankton biomass and rates of primary production being considerably higher in 1990-91 than in 1992-93. (Auth. mod.)

B-52782

Cripps, G.C., **Occurrence of monounsaturated n-C_{21} and polyunsaturated C_{25} sedimentary hydrocarbons in the lipids of antarctic marine organisms,** *Polar biology,* Apr. 1995, 15(4), p.253-259, 18 refs.

Antarctic zooplankton have been found to be a potential source of sedimentary hydrocarbons. Monounsaturated C_{21} n-alkenes and highly branched polyunsaturated C_{25} n-alkenes were analyzed in the aliphatic fraction of the lipids of antarctic pelagic and inshore marine organisms. Cluster analysis of the species-based data set produced four main groups: phytoplankton, epipelagic herbivores, epipelagic carnivores and mesopelagic omnivores. The detailed pattern of alkenes exhibited differences within the groups and also with tissue type (krill). The origin of alkenes in antarctic biota appeared to be either synthesis de novo or due to the condensation of smaller molecules. Formation of alkenes by the decarboxylation of fatty acids was not consistent with the hydrocarbon and fatty acid composition of antarctic zooplankton. There was no evidence for direct assimilation of C_{21} and C_{25} alkenes by zooplankton or higher predators from their diet. (Auth. mod.)

B-52783

Nordøy, E.S., Folkow, L., Blix, A.S., **Distribution and diving behaviour of crabeater seals *(Lobodon carcinophagus)* off Queen Maud Land,** *Polar biology,* Apr. 1995, 15(4), p.261-268, Refs p.267-268.

Eight crabeater seals *(Lobodon carcinophagus)* (three females, five males), ranging in body mass from 125 to 220 kg, were captured off Queen Maud Land during the last week of Feb. 1993, just after moulting, and tagged with Argos satellite-linked dive recorders to provide data on location and diving depth and duration. During the first few weeks of Mar. the seals were moving in the pack ice along the continental shelf edge, close to the coast of Queen Maud Land. In Apr. and May, when the pack ice extended northwards, most of the seals moved north, one reaching 63°S in late May. In the first half of June the two remaining seals turned south and moved back deep into the pack ice. The seals made about 150 dives per day each throughout the study period. Ninety percent of these were made to depths of less than 52 m. Individual maximum diving depths varied between 288 and 528 m. In Mar. the seals were most active at night, when the dive depth was shallower than during the day. In Apr. and May the seals were more active during daytime, with an absence of any diurnal change in diving depth. (Auth.)

B-52784

McMinn, A., Gibson, J., Hodgson, D., Aschman, J., **Nutrient limitation in Ellis Fjord, eastern Antarctica,** *Polar biology,* Apr. 1995, 15(4), p.269-276, Refs p.275-276.

The occurrence of high chlorophyll-*a* concentrations (up to 11.6 µg/l) at shallow depths within Ellis Fjord, East Antarctica during spring and summer coincided with the development of a stratified water column. Macronutrient concentrations during periods of high chlorophyll-*a* levels were very low. Phosphate concentrations decreased to 0.2 µM, nitrate to 0.4 µM and silicate to 3.9 µM. High rates of nutrient depletion early in the season can be explained by strong sea-ice algal mat development. An Si:N:P uptake ratio of 25.5:13.8:1 indicates a strong demand for silicate. Minimum silicate levels were below those necessary for maximum diatom growth and probably contributed to the successional shift from diatoms to phytoflagellates. (Auth.)

B-52785

Palmer Locarnini, S.J., Presley, B.J., **Trace element concentrations in antarctic krill, *Euphausia superba*,** *Polar biology,* Apr. 1995, 15(4), p.283-288, 21 refs.

Whole antarctic krill collected along the western Antarctic Peninsula were analyzed for 14 elements. Average element abundances (in parentheses) in µg/g, in descending order, were as follows: P(9940), Cu(80.5), Zn(43.5), Fe(28.0), Se(5.80), Ba(3.78), Mn(1.98), As(1.92), Ag(1.71), Ni(0.54), Cr(0.30), Cd(0.29), Pb(0.22), and Hg(0.025). Inverse relationships were found between krill length and Hg concentration as well as between As and P levels. A geographic trend of increasing Mn and P levels from southwest to northeast along the Antarctic Peninsula was found. Results were compared to earlier data for evidence of metal concentration changes due to anthropogenic activity over the last 15 years. (Auth.)

B-52786

Jackson, J.E., **Notes on the biology of *Eudonia mawsoni* (Lepidoptera: Pyralidae) on subantarctic Macquarie Island,** *Polar biology,* Apr. 1995, 15(4), p.289-294, 24 refs.

Eudonia mawsoni, the only moth breeding on Macquarie I., was sampled to measure density and sex ratios in different habitats and at different altitudes, and to investigate the distribution of color morphs. Sites sampled ranged in altitude from 20 to 433 m above sea level, and included mire, short grassland, herbfield, feldmark and moss. Adult moths were widespread, occurring from sea level to the highest mountain (433 m a.s.l.). Mean density ranged from 0 to 2.3/m^2. Frequencies of males and females differed significantly for only 6 of the 24 sampling events, with males predominant at 5 of those 6. Females predominated only in collections from a pure moss site, where they appeared to gather to oviposit. In some vegetation types, moth sex proportions differed significantly from average proportions, with the proportion of females elevated in feldmark and moss, and depressed in mire. (Auth. mod.)

B-52787

Cantone, G., **Polychaeta "Sedentaria" of Terra Nova Bay (Ross Sea, Antarctica): Capitellidae to Serpulidae,** *Polar biology,* Apr. 1995, 15(4), p.295-302, 5 refs.

Capitellidae, Maldanidae, Trichobranchidae, Terebellidae, Sabellidae, Serpulidae and Spirorbidae found in Terra Nova Bay have been studied. Thirty-one species have been identified, one of which, *Praxillella praetermissa antarctica*, is a new subspecies. About 75% of the species are endemic to Antarctica or the Subantarctic. The geographic distribution of some species has been extended. (Auth.)

B-52794

Arntz, W.E., Brey, T., Gallardo, V.A., **Antarctic zoobenthos,** *Oceanography and marine biology,* 1994, Vol.32, p.241-304, Refs. p.290-304.

DLC GC1.O32

Technical progress in recent years has extended antarctic benthic research through more sensitive physiological techniques, more sophisticated and reliable measurements of environmental parameters, more efficient sampling gear, and a multitude of statistical and computer based methods. Based on recent literature (since 1985) on or related to antarctic benthic research, but also considering major advances published earlier, this book summarizes the present state of knowledge on: environmental conditions in the past and present; evolution and zoogeography; species richness and biodiversity; abundance and biomass; community dynamics and interactions; physiology and autecology; and life history strategies, mainly reproduction, growth and productivity, of the antarctic benthic fauna. Two additional sections deal with conservational and methodological aspects related to antarctic benthic communities. (Auth. mod.)

B-52796

Martin, G., Jaros, P.P., Chaigneau, J., Meyer-Rochow, V.B., **Intracerebral ocelli in the giant antarctic slater *Glyptonotus antarcticus* (Isopoda: Valvifera),** *Journal of crustacean biology,* May 1995, 15(2), p.228-235, With French summary. Refs. p.234-235.

Details on the location and ultrastructural organization of 2 intracerebral ocellar regions in the giant antarctic slater *Glyptonotus antarcticus* are given. Each ocellar region measures approximately 120 x 45 µm and consists of 2 overlapping ocellar subunits inserted under the neurilemma in the median part of the protocerebrum. One subunit comprises 2 retinula cells; the second 3. Small rhabdoms, made up of typical microvilli, are formed by both subunits. Lipid droplets, but no screening pigment granules, were present in all 5 retinula cells together with a host of intracellular organelles characteristic of membrane-turnover processes. It is concluded that direct photostimulation of the intracerebral ocelli is likely and that functionally they could be analogous to the pineal organ of lower vertebrates. Evidence is presented that, at least anatomically, the intracerebral ocelli are independent from other sensory complexes in the head of *G. antarcticus,* such as the compound eyes, the organ of Bellonci, and the sensory pores. (Auth.)

B-52797

Kopczyńska, E.E., Goeyens, L., Semeneh, M., Dehairs, F., **Phytoplankton composition and cell carbon distribution in Prydz Bay, Antarctica: relation to organic particulate matter and its δ^{13}C values,** *Journal of plankton research,* Apr. 1995, 17(4), p.685-707, Refs. p.705-707.

In Jan.-Feb. 1991 in Prydz Bay, phytoplankton bloom was evident in the inner shelf area with the dominant diatoms being represented mainly by pennate species of the *Nitzschia-Fragilariopsis* group. Dinoflagellates and naked flagellates were most abundant in the center of the bay; however, larger heterotrophic species prevailed at the southern stations. Cell carbon values found in the bloom in the south were chiefly due to pennate diatoms and larger heterotrophic dinoflagellates. Much lower carbon values in the outer shelf region were mainly contributed by large centric diatoms and small dinoflagellates. Wide ranges of algal cell sizes were observed in both southern and northern communities; the overlapping of sizes of diatoms and flagellates, the latter containing heterotrophs, suggest complex trophic relationships within the plankton and an enhanced heterotrophic activity in the south. North-to-south variations in surface $\delta^{13}C$ of suspended particulate organic matter (SPOM) were directly related to the concentration of particulate matter; this suggested the effect of biomass, and thus of dissolved CO_2 limitation on carbon fractionation. (Auth. mod.)

B-52806

Faranda, F., ed, Guglielmo, L., ed, Italy, National Scientific Commission for Antarctica, **Ross Sea expeditions 1987-1988 and 1989-1990: Data report, Part III, physical, chemical and biological oceanography,** Genoa, 1994, 222p., Refs. passim. For selected papers see B-52807 through B-52812.

This volume contains a collection of 6 reports based on physical, chemical and biological studies carried out during the 1987-1988 and 1989-1990 Italian expeditions in the Ross Sea and at the Terra Nova Bay Station. The resulting data are presented in numerous tables and graphs.

B-52807

Nuccio, C., Innamorati, M., Mori, G., Lazzara, L., Nizzi Grifi, G., **Phytoplankton ecology: species density in the Ross Sea. Oceanographic campaign 1987-1988,** Italy, National Scientific Commission for Antarctica. Ross Sea expeditions 1987-1988 and 1989-1990: Data report, Part III, physical, chemical and biological oceanography. Edited by F. Faranda and L. Guglielmo, Genoa, 1994, p.5-48, 24 refs.

Investigations carried out in the Ross Sea in Jan.-Feb. 1988 covered phytoplankton spatial distribution and species composition related to environmental factors. The resulting data are presented in 40 tables.

B-52808

Albertelli, G., Arnaud, P.M., Cattaneo-Vietti, R., **Shallow and deep-sea bivalve molluscs of Terra Nova Bay, Ross Sea, Antarctica,** Italy, National Scientific Commission for Antarctica. Ross Sea expeditions 1987-1988 and 1989-1990: Data report, Part III, physical, chemical and biological oceanography. Edited by F. Faranda and L. Guglielmo, Genoa, 1994, p.49-66, 10 refs.

Investigations carried out during two Italian cruises in Terra Nova Bay area in 1987-1988 are discussed, and the resulting data are presented in tables. The main object of the investigation was not only to improve the knowledge of the Ross Sea bivalve fauna, but also to analyze its vertical and horizontal distribution as related to environmental parameters, its diversity and, in the case of *Adamussium colbecki,* some aspects related to its population dynamics and biometric characteristics.

B-52809

Pansini, M., Calcinai, B., Cattaneo-Vietti, R., Sará, M., **Demosponges from Terra Nova Bay (Ross Sea, Antarctica): 1987/88 and 1989/90 P.N.R.A. expeditions,** Italy, National Scientific Commission for Antarctica. Ross Sea expeditions 1987-1988 and 1989-1990: Data report, Part III, physical, chemical and biological oceanography. Edited by F. Faranda and L. Guglielmo, Genoa, 1994, p.67-100, Refs. p.82-84.

Demosponges collected during the Italian expeditions of 1987-1988 and 1989-1990 are described and listed in tables. A total of 43 *Demospongiae* species belonging to 7 orders and 15 families have been identified. The identified sponge species are referred to the sectors corresponding to different areas within Terra Nova Bay. Each sector includes several sampling stations.

B-52810

Innamorati, M., et al, **Phytoplankton ecology: particles, gilvin, fluorescence spectra, irradiance and phytoplankton species density in the Ross Sea. Oceanographic campaign 1989-90,** Italy, National Scientific Commission for Antarctica. Ross Sea expeditions 1987-1988 and 1989-1990: Data report, Part III, physical, chemical and biological oceanography. Edited by F. Faranda and L. Guglielmo, Genoa, 1994, p.101-178, Refs. p.103-105.

This report deals with data obtained by investigations in oceanic and neritic areas of Terra Nova Bay and the South Pacific Ocean. Presented in numerous tables are vertical profiles of underwater quantum and spectral PAR irradiance, suspended particle density and size spectra, some fluorescence excitation and emission spectra, gilvin absorption, and phytoplankton species density.

B-52811

Gambi, M.C., Castelli, A., **First quantitative data on coastal soft bottoms populations off Terra Nova Bay (Ross Sea, Antarctica): polychaetes,** Italy, National Scientific Commission for Antarctica. Ross Sea expeditions 1987-1988 and 1989-1990: Data report, Part III, physical, chemical and biological oceanography. Edited by F. Faranda and L. Guglielmo, Genoa, 1994, p.179-186, 8 refs.

From a study of quantitative and functional aspects of the antarctic coastal benthos, first data on benthic populations of Terra Nova Bay coastal soft bottoms are reported. Infaunal macrobenthos was found in all samples collected, and was dominated by polychaetes, which accounted for more than 76% of the total abundance. Their species composition, distribution and diversity pattern were determined. A total of 5775 individuals of polychaetes were classified at different taxonomic levels, which are shown in a table. A total of 76 taxa are identified.

B-52812

Russo, G.F., Gambi, M.C., **First quantitative data on coastal soft bottoms populations off Terra Nova Bay (Ross Sea, Antarctica): bivalve molluscs,** Italy, National Scientific Commission for Antarctica. Ross Sea expeditions 1987-1988 and 1989-1990: Data report, Part III, physical, chemical and biological oceanography. Edited by F. Faranda and L. Guglielmo, Genoa, 1994, p.187-190, 2 refs.

Based on a study of quantitative and functional aspects of the coastal benthos of Terra Nova Bay, benthic bivalve mollusc communities of coastal soft bottoms are discussed in the present report. A total of 291 individual bivalves were found and classified in 13 taxa. Bivalves represent 40% of the total abundance of the molluscs collected in the samples (58% gastropods; 1.3% scaphopods; and 0.7% chitons).

B-52813

Orgeira, J.L., **Recording of Wilson's Storm Petrels *(Oceanites oceanicus)* from the Weddell Sea** [Regístros del petrel de Wilson *(Oceanites oceanicus)* en el mar de Weddell, Antártida], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1994, No.436, 5p., In Spanish with English summary. 16 refs.

Observations of Wilson's Storm petrel *(Oceanites oceanicus)* were made in the Weddell Sea area in Jan. and Feb. 1988, 1990, 1992 and 1993. A comparison of the southernmost recordings done up to the present indicates the presence of a colony near the colony at Bertrab Nunatak (Filchner Ice Shelf), though its location is still uncertain. Breeding and feeding schedules and the pelagic range of the species are cited as factors that might have helped colonization in the area. (Auth.)

B-52816

Montalti, D., Coria, N.R., **Stomach flushing techniques in studies of diet in seabirds** [Técnica de lavado estomacal para estudios de dieta en aves marinas], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1994, No.429, 6p., In Spanish with English summary. 23 refs.

A modified stomach flushing technique for obtaining complete samples of stomach contents, described by Wilson (1984), was used on Black-bellied Storm petrels, Giant petrels, Brown skuas and Greater sheathbills on Laurie I. Examination of the contents showed that the technique is effective. However, the study showed that multiple flushes are essential to empty the stomachs of the four species of seabirds used. (Auth. mod.)

B-52817

Alzola, R., Najle, R., Curtosi, A., Solana, H., Aracil, E., **Study of the kinetics of organometallic toxification in antarctic fauna** [Estudio de la cinética de la intoxicación con organometálicos en fauna antártica], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1994, No.427, 11 p., In Spanish with English summary. 16 refs.

A variety of industrial chemical products can pollute the environment. Trimethyltin (TMT), a potent neurotoxicant, is in that series. The authors experimentally intoxicated papua penguins *(Pygoscelis papua)* with TMT doses of 15 mg/kg b.w. As main clinical manifestations, the birds showed depression. After 48 hrs post-dose, histopathological findings were unspecific and consisted in colliquative necrosis of the central nervous system (CNS) and ballooning-center-lobular necrosis of the liver. No injuries in the kidney were found. (Auth.)

B-52818

Brittain, T., **Two-state thermodynamic and kinetic analysis of the allosteric functioning of the haemoglobin of an extreme poikilotherm,** *Biochemical journal,* Aug. 1, 1984, 221(3), p.561-568, 30 refs.

DLC QP501.B47

The blood of the extreme poikilotherm *Trematomus borchgrevinki* contains one major haemoglobin component, which may be separated from the minor species by ion-exchange chromatography. Analysis of the temperature-dependence of the binding curves has allowed the thermodynamic constants associated with the two-state allosteric parameters L, K_R and K_T to be measured. The binding of CO at lower pH (6.2) is characterized by the maintenance of the T-state to relatively high degrees of saturation. Kinetic investigations with the use of flash photolysis of the haemoglobin-CO complex under various conditions has allowed the determination of the thermodynamic parameters association with the T-state and R-state rate constants. The overall findings show that this haemoglobin closely follows the two-state model of co-operative interaction. (Auth. mod.)

B-52819

Montgomery, J.C., **Low temperature increases gain in the fish oculomotor system,** *Journal of neurobiology,* July 1984, 15(4), p.295-298, 12 refs.

DLC QP351.J55

An experiment is described in which the relationships between the ambient temperature and the eye motor responses in antarctic fish are examined.

B-52821

Culik, B.M., Wilson, R.P., Bannasch, R., **Underwater swimming at low energetic cost by pygoscelid penguins,** *Journal of experimental biology,* Dec. 1994, Vol.197, p.65-78, 41 refs.

DLC QH301.J68 1994

Energetic requirements of underwater swimming in pygoscelid penguins were studied in Antarctica, using respirometry together with a 21 m long swim canal and externally attached devices recording the swimming speed and dive duration of unrestrained animals. Field measurements were compared with measurements of the hydrodynamic properties of an Adélie penguin model in a circulating water tank. Minimum transport costs during underwater swimming in Adélie, chinstrap and gentoo penguins averaged 4.9, 3.7 and 7.6 J/kg/m, respectively, at their preferred swimming speeds of 2.2, 2.4 and 1.8 m/s, allowing the birds to dive aerobically for 110, 130 and 93s, respectively. From the swim canal measurements, a drag coefficient (C_D) of 0.0368 was calculated for a typical Adélie penguin at 2.2 m/s. This value is significantly lower than the C_D of 0.04 of an ideal spindle and the C_D of 0.0496 measured on the model in the laboratory. The reasons for this difference are discussed. (Auth.)

B-52825

Sidell, B.D., Crockett, E.L., Driedzic, W.R., **Antarctic fish tissues preferentially catabolize monoenoic fatty acids,** *Journal of experimental zoology,* Feb. 1, 1995, 271(2), p.73-81, 39 refs.

In vitro measurements were made of the rates of oxidation of ^{14}C-labeled carbohydrates and fatty acids by oxidative skeletal muscle and heart ventricle of an antarctic teleost, *Gobionotothen gibberifrons* to assess the relative importance of these substrates to aerobic energy metabolism. Capacities for regeneration of ATP calculated from oxidation rates of these fuels clearly indicate that fatty acids are more effective substrates of energy metabolism than either glucose or lactate with both tissues. Substrate competition experiments conducted between the saturated fatty acid palmitate (16:1) and the monoenoic unsaturate oleate (18:1) comparing the oxidation rate of radio-labeled fatty acid in the presence and absence of unlabeled competitor demonstrate a clear preference of both tissue types for catabolism of the monounsaturated substrate. The general pattern of results suggests that monounsaturated fatty compounds are the most readily utilized substrates for energy metabolism by oxidative muscle tissues of this antarctic species. (Auth. mod.)

B-52826

Yoshida, W.Y., Bryan, P.J., Baker, B.J., McClintock, J.B., **Pteroenone: a defensive metabolite of the abducted antarctic Pteropod *Clione antarctica*,** *Journal of organic chemistry,* Feb. 10, 1995, 60(3), p.780-782, 15 refs.

The pteropod *Clione antarctica (=Clione limacina)* is a shell-less, pelagic mollusc which blooms each austral summer in McMurdo Sound. An intriguing relationship exists between *C. antarctica* and an antarctic hyperiid amphipod, *Hyperiella dilatata;* the amphipod, a frequent prey item of several antarctic fish, is capable of grasping *C. antarctica* from the water column and positioning it on its dorsum where the chemically defended mollusc serves to prevent predation of the amphipod. This protective property of the pteropod was demonstrated by the rejection of amphipod/mollusc pairs, as well as the mollusc itself, by predatory fish. Amphipods alone, or amphipods which dropped their attached pteropod, were readily consumed. Utilizing these same predatory fish as the basis of a bioassay guided isolation, carried out at McMurdo Station, has resulted in the isolation of a substance which protects *C. antarctica,* and ultimately *H. dilatata,* from predation. The authors report here the chemical nature of this feeding deterrent which they have named pteroenone. (Auth. mod.)

B-52827

Benassi, G., Ferrari, I., Menozzi, P., McKenzie, K.G., **Planktic ostracodes from the Antarctic and Subantarctic collected by the 1989-1990 Italian Antarctic Expedition,** *Australian Museum. Records,* May 19, 1994, 46(1), p.25-37, 15 refs.

Eleven species of planktic Ostracoda were collected by the Italian Antarctic Expedition of 1989-90 from the region south of New Zealand in the southern ocean to the Ross Sea. Of these species, only *Proceroecia rivoltella* n.sp. (described herein) and *Gigantocypris muelleri* were not recorded by Deevey (1982) from much the same area. Depth distributions are given for the more commonly encountered taxa, *Alacia belgicae, A. hettacra, Boroecia antipoda, Metaconchoecia skogsbergi* and *M. isocheira.* Much of the total Ostracoda density at each station is due to the dominance of *A. hettacra* at lower latitudes and *A. belgicae* at higher latitudes. The near identity with Deevey's records confirms that the planktic ostracodes of high southern latitudes are now reasonably well known, at least to depths less than 1000 m. (Auth.)

B-52828

Pandey, K.D., Kashyap, A.K., Gupta, R.K., **Nutrient status, algal and cyanobacterial flora of six fresh water streams of Schirmacher Oasis, Antarctica,** *Hydrobiologia,* Mar. 3, 1995, 299(1), p.83-91, Refs. p.90-91.

The algal and cyanobacterial flora and the chemical environment of six freshwater streams of Schirmacher Ponds were investigated. Over 30 species of algae, predominantly the cyanobacteria *(Cyanophyceae),* were recorded. N_2-fixing species, both heterocystous and unicellular diazotrophs, contributed more than 50% to the counts; their dominance was greatest in the middle of the stream where nitrogen and other nutrients were low. Green algae and diatoms also contributed to the flora. The species composition varied among streams. Glacial and snowdrift meltwater streams contained a distinctive community. Based on diversity indices, these streams could be classified into two clusters. (Auth.)

B-52830

Weeks, A.R., Robinson, I.S., Aiken, J., Moore, G.F., **Maintaining a phytoplankton bloom in low mixed layer illumination in the Bellingshausen Sea in the austral spring, 1992,** *SPIE—The International Society for Optical Engineering. Proceedings,* 1994, Vol.2258, Ocean Optics XII, Bergen, Norway, June 13-15, 1994. Edited by J.S. Jaffe, p.90-104, 23 refs.

DLC GC177.6.O27 No.12 1994

A phytoplankton bloom was observed between 67.2°S and 68.5°S which extended over at least 4° of longitude from 84° to 88°W in the Bellingshausen Sea. The northern boundary of the bloom was associated with a strong eastward flowing surface jet of low salinity water. The controlling factors for phytoplankton growth were explored by examining north to south transects of surface stability, inorganic nutrients, mean mixed layer irradiance and surface currents. The only parameter found to change along with the phytoplankton biomass was the mean mixed layer irradiance, which approached the light limitation thresholds for antarctic phytoplankton. A hypothesis to explain the high concentrations of phytoplankton suggests a positive feedback mechanism in which the phytoplankton grow well in the low light conditions of the mixed layer.

B-52833

Cherel, Y., Mauget, R., Lacroix, A., Gilles, J., **Seasonal and fasting-related changes in circulating gonadal steroids and prolactin in King Penguins, *Aptenodytes patagonicus*,** *Physiological zoology,* Sep.-Oct. 1994, 67(5), p.1154-1173, Refs. p.1170-1173.

Temporal correlations between reproductive endocrinology and the breeding and molt cycle of the king penguin were studied on the Crozet Is. This species is unqiue in having a long cycle (14-15 mo.) mainly due to a prolonged fledging period (11 mo.), which includes the austral winter. Plasma gonadal steroids and prolactin were at their minimum levels during the prebreeding molt. However, circulating testosterone (males) and estradiol and progesterone (females) were already elevated at the time of arrival at the colony to breed, and the levels peaked during copulation. After laying, plasma steroids decreased but remained above basal levels during the following months. Prolactin was low during the sexual phase of the reproductive cycle of both males and females. It reached high plasma concentrations in incubating birds and remained elevated during the whole fledging period. (Auth. mod.)

B-52834

Cripps, G.C., Priddle, J., **Hydrocarbon content of an antarctic infaunal bivalve—historical record or life cycle changes?,** *Antarctic science,* June 1995, 7(2), p.127-136, 15 refs.

The antarctic bivalve *Yoldia eightsi* (Couthouy) has been assessed as a monitor species in the vicinity of a research station at Signy I. For animals of comparable age *n*-alkane loading was highest at the site closest to the station. The character of the *n*-alkane pool of *Yoldia* varied with distance from the station and also differed from that of the sediment. The polycyclic aromatic hydrocarbon (PAH) loading was highest at 250 m from the station. Loading of *n*-alkanes and PAH varied through the year; the lowest levels of *n*-alkanes were in Oct. and the highest in Apr. The maximum for PAH was in Oct. Hydrocarbons increased with age for animals from five to 50 years old. Tissue concentrations decreased with age. Several biogenic branched chain alkenes were also present. Accumulation was not constant with age and concentrations reflected both anthropogenic and biogenic hydrocarbons in the marine environment. *Y. eightsi* were not suitable to monitor low level contamination such as that at Signy I. and past incidents were not resolved from the background input. (Auth. mod.)

B-52835

Green, G., Nichols, P.D., **Hydrocarbons and sterols in marine sediments and soils at Davis Station, Antarctica: a survey for human-derived contaminants,** *Antarctic science,* June 1995, 7(2), p.137-144, 31 refs.

A survey of hydrocarbons and sterols in marine and shoreline sediments was undertaken adjacent to Davis Station to determine the impact of a human settlement, including a sewage outfall, on the local marine environment. Soil samples from selected locations onshore were also analyzed to ascertain the extent of hydrocarbon contamination emanating from fuel storage facilities and other potential sources. The faecal sterol coprostanol was detected at 13.2 µg/g (60% of total sterols) in sediment adjacent to the Davis sewage outfall and up to 5.0 µg/g on the shoreline at Davis Beach. These concentrations indicate significant faecal contamination. The absence of coprostanol in faeces from the local wildlife confirms a human origin for this sewage biomarker. Hydrocarbons on the shoreline near Davis were present at up to 5.5 µg/g (dry weight of sediment). Biomarker profiles indicate an anthropogenic origin for these hydrocarbons. Onshore, degraded hydrocarbons derived from Special Antarctic Blend distillate were found at relatively high levels in soils at the fuel storage depot (up to 220 µg/g). The source of these hydrocarbons appeared to be spillage from fuel storage tanks with possible contributions from fuel pipeline leakage and vehicle usage. (Auth. mod.)

B-52836

Pridmore, R.D., Vant, W.N., Cummings, V.J., **Factors affecting the water clarity of ponds on the McMurdo Ice Shelf, Antarctica,** *Antarctic science,* June 1995, 7(2), p.145-148, 24 refs.

The clarity of 39 meltwater ponds on the McMurdo Ice Shelf was determined as the horizontal viewing range of a black disc. Visual ranges varied widely from pond to pond from 0.14-5 m; so did the concentrations of optically-active constituents, including the suspended particles, phytoplankton (10-fold variation) and inorganic suspensoids (>100-fold), and dissolved yellow substance (10-fold). In six of the ponds the ratio of beam attenuation coefficient to total suspended solids concentration was low (<0.6 m^2/g) compared to that in the others (0.7-2.0 m^2/g), suggesting that generally larger particles were present suspended in the water in these ponds. In both groups, relationships between beam attenuation and constituent concentrations indicated that much of the attenuation was due to inorganic suspensoids. Even though the clarity of many of the ponds was poor, their relative shallowness meant levels of underwater light were probably generally adequate for benthic plant growth. (Auth.)

B-52853

Zmijewska, M.I., **Seasonal and spatial variations in the population structure and life histories of the antarctic copepod species *Calanoides acutus, Calanus propinquus, Rhincalanus gigas, Metridia gerlachei* and *Euchaeta antarctica* (Calanoida) in Croker Passage (Antarctic Peninsula),** *Oceanologia,* 1993, No.35, p.73-100, Refs. p.96-100.

Seasonal and spatial variations in the population structure and life cycles of 5 antarctic copepod species, *Calanoides acutus, Calanus propinquus, Rhincalanus gigas, Metridia gerlachei* and *Euchaeta antarctica,* have been reconstructed from analyses of sets of vertically-stratified zooplankton samples taken with a 200 µ-mesh net by day and by night during summer 1985-86, autumn 1988 and winter 1989, from the 1200 m deep Croker Passage. Developmental stages from C1 to adults were enumerated. Sex ratios were determined in *M. gerlachei* from C5 to adults, in *E. antarctica* from C4 to adults, and in other species in adults only. Seasonal changes in the relative depth distribution and abundance of the various stages were used to compare the population dynamics of these 5 copepods. The life span of *C. acutus* is less than one year, while *C. propinquus* can live for more than a year. The population of *R. gigas* shows the occurrence of 2 generations per year. Multiple generations are noted for *M. gerlachei,* while *E. antarctica* shows a single reproductive peak in the winter followed by the growth of a single generation. (Auth. mod.)

B-52854

Zmijewska, M.I., Yen, J., **Seasonal and diel changes in the abundance and vertical distribution of the antarctic copepod species *Calanoides acutus, Calanus propinquus, Rhincalanus gigas, Metridia gerlachei* and *Euchaeta antarctica* (Calanoida) in Croker Passage (Antarctic Peninsula),** *Oceanologia,* 1993, No.35, p.101-127, Refs. p.123-127.

Seasonal and diel changes in the abundance and vertical distribution of 5 species of antarctic copepods, *Calanoides acutus, Calanus propinquus, Rhincalanus gigas, Euchaeta antarctica* and *Metridia gerlachei,* have been reconstructed from analyses of sets of vertically-stratified zooplankton samples taken by day and night during summer 1985-86, autumn 1988 and winter 1989, from the 1200 m deep Croker Passage. The most abundant species is *M. gerlachei.* Seasonal ontogenetic migrations are performed by *C. acutus, C. propinquus* and *R. gigas.* In summer, in a 1000 m water column, herbivorous species live above the *M. gerlachei* population, but in winter, below it. Both *M. gerlachei* and *E. antarctica* perform diel migrations, clearly marked in the former species, less so in the latter. *M. gerlachei* inhabits the middle part of the water column during the day, but rises nearer the surface at night. *E. antarctica* inhabits the deepest layer; at night adults, mainly females, ascend towards the surface. (Auth. mod.)

B-52855

Convey, P., **Use of field enclosures to measure growth and mortality rates in an antarctic collembolan,** *Acta zoologica Fennica,* Dec. 1994, Vol.195, p.18-22, 28 refs.

The design of an enclosure for long-term studies of growth rates and survival of microarthropods under maritime antarctic field conditions is described, providing a habitat structure and food source similar to their natural environment. Microclimate recording may be incorporated into the enclosure design. Using such enclosures, a study of growth and survival of three size classes of the antarctic springtail *Cryptopygus antarcticus* (Collembola, Isotomidae) was carried out over a 10 month period. Regular sampling of replicated enclosures allowed measurement of growth and mortality rates (in the absence of predation), and a more detailed description of the species' life cycle than hitherto possible. *Cryptopygus* is capable of rapid growth during the short antarctic summer, with reduced growth and good survival over-winter. Despite this, over-winter mortality is higher than that experienced in the rest of the year. The complete life cycle (egg-egg) takes a minimum of two years under field conditions. Microclimate amelioration by use of plastic cloches led to decreased survival and growth (and even weight loss) for all three size classes. (Auth.)

B-52856

Greenslade, P., Van Klinken, R.D., **Marine littoral and coastal Collembola on the subantarctic Macquarie Island,** *Acta zoologica Fennica,* Dec. 1994, Vol.195, p.58-61, 9 refs.

Macquarie I. harbors 153 terrestrial arthropods, including 32 Collembola. Of the collembolan species which are native to the island, 16 were collected from the marine littoral zone. Six are common in the beaches and appear to breed there, two of them being restricted to this habitat; eight occur on rocky shores where three are restricted. The other native species are found sporadically on beaches but are more common in the tussock grassland and herbland of the coastal shelf and plateau. Four of the marine coastal species have wide ecological tolerances and occur equally abundantly on the central plateau of the island. Species are zoned on sandy beaches but not on rocky shores where none were found below the lichen zone. The highest species richness occurs at the interface between the marine and terrestrial zones, as all but eleven Macquarie I. species are found here. Biogeographical affinities of the marine littoral fauna are predominantly with other subantarctic islands to the west. (Auth.)

B-52858

Shaughnessy, P., **Status of fur seals in the Australian Subantarctic,** *Antarctic Society of Australia. Information brochure,* June 1993, No.3, p.1-4, 10 refs.

The most abundant seal in the Australian Subantarctic is the southern elephant seal *Mirounga leonina,* which breeds at both Macquarie and Heard islands. Other breeding species are southern fur seals of the genus *Arctocephalus,* which form the topic of this information brochure. A regular visitor to both islands is the leopard seal *Hydrurga leptonyx,* which breeds on the antarctic pack ice. Irregular visitors are the crabeater seal *Lobodon carcinophagus* from the antarctic pack ice and the New Zealand sea lion *Phocarctos hookeri* from the Auckland Is. The last species has been recorded at Macquarie I. but not Heard I. Characteristics of the three species of fur seal found at Australian subantarctic islands are outlined.

B-52864

Wägele, H., Barnes, D.K.A., Bullough, L.W., **Redescription of *Charcotia granulosa* Vayssière, 1906 (Nudibranchia: Arminoidea: Charcotiidae) from Signy Island, Antarctica,** *Journal of molluscan studies,* May 1995, 61(2), p.197-207, 8 refs.

The nudibranch *Charcotia granulosa,* described originally by Vayssière (1906) from one specimen, was recollected for the first time at Signy I. These three specimens allow a redescription of the morphology, anatomy and histology. The synapomorphies of the Charcotiidae (narrow, glandular stripe on the right side starting behind the female genital opening, and running posteriorly above the nephroproct and anal papilla, and flat, rudimentary lateral radular teeth), with the two genera, the monotypic *Charcotia* Vayssière, 1906 and *Pseudotritonia* Thiele, 1912 (with three species) are discussed.

B-52867

Jackson, A.E., Seppelt, R.D., **Accumulation of proline in *Prasiola crispa* during winter in Antarctica,** *Physiologia plantarum,* May 1995, 94(1), p.25-30, 17 refs.

Samples of *Prasiola crispa* were collected in Antarctica over a 13-month period and analyzed for free amino acids by high performance liquid chromatography. There was a marked increase in the levels of proline with the onset of winter, concurrent with a decrease in the other predominant amino acids. In Jan., proline constituted 1.2±0.1 μmol/(g dry weight), whereas by mid-Apr. it was the major component at 28.4±2.9 μmol/(g dry weight). When winter samples were thawed in a growth cabinet, their proline content declined to 4.3±0.5 μmol/(g dry weight) after 7 days. Measurements of photosynthetic quantum yield indicated that winter samples of *P. crispa* also recovered photosynthetic activity upon thawing. Amino acids and other solutes are involved in the preservation of photosynthetic activities during freezing and it seems probable that proline is involved in cryoprotection in this species. In summer samples, there was no evidence that proline levels in *P. crispa* increased with the conductivity of the water in which they were found growing. (Auth. mod.)

B-52869

Hanke, G., **Occurrence, distribution and turnover of biogenic trace compounds: Sterols in antarctic waters** [Vorkommen, Verteilung and Umsatz biogener organischer Spurenstoffe: Sterole in antarktischen Gewässern], *Berichte zur Polarforschung,* 1995, No.165, 168p., In German with English summary. The work is based on the author's dissertation submitted to the University of Bremen in 1994. Refs. p.127-140.

The main part of the investigations was the determination of the concentration distribution of the thirteen sterols in the whole water column on a transect through the Weddell Sea from Cape Norvegia to the Antarctic Peninsula. Sterol distributions show that the transport into deep sea is achieved by sinking particles. Different cholesterol portions distinguish regions, in which mainly sinking faecal pellets determine the sterol pattern, from those in which sinking algal material is more abundant. One aim of this work was to find out if organic compounds introduced into the surface water by dissolution of fresh organic matter are transported into the deep sea with the downwelling shelf water in the northwestern Weddell Sea. At numerous stations increased sterol concentrations were found close to the sea floor; however these were also found in water masses little influenced by antarctic bottom water, and some samples of antarctic bottom water had no elevated concentrations. (Auth. mod.)

B-52871

Everson, I., **Timescale of ovarian maturation in *Notothenia coriiceps*; evidence for a prolonged adolescent phase,** *Journal of fish biology,* June 1994, 44(6), p.997-1004, 7 refs.

Ovarian maturation in *Notothenia coriiceps* is known to include a period during which yolk deposition begins to take place. This 'adolescent' phase was thought originally to last for about 1 year. The results from a 2-year study at Signy I. now indicate that the adolescent phase lasts for about 4 years. There is also some evidence to indicate that not all sexually mature fish spawn each season. Two reproductive strategies are considered, one where adverse conditions are accompanied by a failure to spawn and an alternative where fecundity is controlled by the number of small oocytes which ripen. (Auth.)

B-52872

Kirst, G.O., Wiencke, C., **Ecophysiology of polar algae,** *Journal of phycology,* Apr. 1995, 31(2), p.181-199, Refs. p.196-199.

Polar marine environments are characterized by extreme variations in irradiance and seasonal changes of day length, accompanied by low water temperatures usually in the range of -1.8° to 2°C (in shallow waters, up to 10°C). Benthic macroalgae are abundant in the tidal zones up to the supralittoral, while microalgae inhabit the sea ice, the ice edge zones, and, as phytoplankton, the open water column. The present review summarizes the physiology and ecophysiology of these algae with the aim of revealing their specific physiological and metabolic properties that allow for adaptation and acclimatization to the special conditions of polar environments. Important abiotic and biotic factors as well as environmental conditions comparing the Arctic and Antarctic are summarized. (Auth. mod.)

B-52873

Quesada, A., Mouget, J.L., Vincent, W.F., **Growth of antarctic cyanobacteria under ultraviolet radiation: UVA counteracts UVB inhibition,** *Journal of phycology,* Apr. 1995, 31(2), p.242-248, Refs. p.247-248.

A mat-forming cyanobacterium *(Phormidium murrayi* West and West) isolated from an ice-shelf pond was grown under white light combined with a range of UVA and UVB irradiances. The 4-day growth rate decreased under increasing ultraviolet (UV) radiation, with a ninefold greater response to UVB relative to UVA. *In vivo* absorbance spectra showed that UVA and to a greater extent UVB caused a decrease in phycocyanin/chlorophyll *a* and an increase in carotenoids/chlorophyll *a*. The phycocyanin/chlorophyll *a* ratio was closely and positively correlated to the UVB-inhibited growth rate. Under fixed spectral gradients of UV radiation, the growth inhibition effect was dominated by UVB. However, at specific UVB irradiances the inhibition of growth depended on the ratio of UVB to UVA, and growth rates increased linearly with increasing UVA. These results are consistent with the view that UVB inhibition represents the balance between damage and repair processes that are each controlled by separate wavebands. They also underscore the need to consider UV spectral balance in laboratory and field assays of UVB toxicity. (Auth.)

B-52877

Schreer, J.F., Testa, J.W., **Statistical classification of diving behavior,** *Marine mammal science,* Jan. 1995, 11(1), p.85-93, 15 refs.

Weddell seals are a good model on which to test multivariate statistical techniques because large amounts of dive data have been collected and their diving behavior is relatively well known and diverse. Weddell seal dives were originally classified into three types depending on the maximum depth and duration of the dives. In this paper an approach to statistical classifying of large data sets of Weddell seal dives is described.

B-52878

Elsner, R., Meiselman, H.J., **Splenic oxygen storage and blood viscosity in seals,** *Marine mammal science,* Jan. 1995, 11(1), p.93-96, 15 refs.

Considerable interest has been shown recently in the phenomenon of changing blood hematocrit in Weddell seals and elephant seals. The increase in hematocrit occurs at the beginning of periods of diving and also of sleep apnea. It is widely suspected that the source of the increase in circulating red blood cells is the spleen. It is also possible that at least some of the stored red blood cells are sequestered in the large venous sinuses typical of phocid seals. These reservoirs are prominent in the inferior vena cava, and blood flow in that structure is sluggish during dives.

B-52879

Gill, P.C., Burton, C.L.K., **Photographic resight of a humpback whale between Western Australia and Antarctic Area IV,** *Marine mammal science,* Jan. 1995, 11(1), p.96-100, 11 refs.

In the past, seasonal migratory movement of Southern Hemisphere humpback whales was demonstrated by the use of "Discovery"-type marks, between antarctic whaling management Area IV (70°-130°E) and Western Australia, and between Antarctica Area V (130°E-170°W) and the southwest Pacific, including eastern Australia. Of 56 humpbacks marked in east Australia or Area V, 3 were killed off Western Australia, demonstrating some movement from Area V to Area IV, though none of 52 marked in Western Australia or Area IV were recaptured to the east.

B-52880

Kock, K.H., Wilhelms, S., Everson, I., Gröger, J., **Variations in the diet composition and feeding intensity of mackerel icefish *Champsocephalus gunnari* at South Georgia (Antarctic),** *Marine ecology progress series,* May 12, 1994, 108(1-2), p.43-57, 59 refs.

In this survey, the contents of about 8,700 mackerel stomachs from fish collected in mid-summers of 1985, 1991, and 1992 were analyzed. The main prey items were krill, an amphipod hyperiid, and two mysid species. The proportion of krill and amphipods in the diet varied considerably among the three years while the mysid proportion remained fairly constant. Krill appears to be the preferred food. The occurrence of krill in the diet in 1991 was among the lowest within a 28 yr period of investigation and variation in food composition among sampling sites was high. This high variation appears to be primarily associated with differences in prey availability. Feeding intensity varied considerably among seasons, being highest in 1992. The proportion of empty stomachs was uncommonly high and stomach content weight was uncommonly low in Jan. 1991, a period when energy-rich food was needed for the final maturation of gonads. (Auth. mod.)

B-52881

Mauget, R., Garcia, V., Jouventin, P., **Endocrine basis of the reproductive pattern of the Gentoo penguin *(Pygoscelis papua)*: winter breeding and extended laying period in northern populations,** *General and comparative endocrinology,* May 1995, 98(2), p.177-184, Refs. p.183-184.

Changes in plasma LH, prolactin, testosterone, estradiol, and progesterone were investigated throughout moult and reproduction in free-living male and female Gentoo penguins at Crozet Is., where this species is able to re-lay after a reproductive failure. In both sexes, LH, prolactin, and steroid hormones remained at basal levels during the moult. LH level was highest at the time of arrival at the colony for breeding and, although it decreased after courtship, it did not drop to basal value by incubation and first chick brooding period. Prolactin peaked for both chick brooding periods; replacement clutch was associated with an increased secretion of LH, whereas high prolactin levels were maintained. Testosterone in males and estradiol in females peaked during courtship I and chick brooding II; progesterone in female peaked during courtship I and II. These hormonal patterns are consistent with those observed in passerine species which are also able to re-lay after a reproductive failure. (Auth.)

B-52883

Chester, S.R., **Antarctic birds and seals,** San Mateo, CA, Wandering Albatross, 1993, 80p., Refs. p.76-77.

DLC QL695.2.C48

This pocket guide presents descriptions and photographs of 53 species of antarctic birds and 6 species of seals.

B-52965

Dragonetti, J.P., Barreiro, D., Güida, G., Regusci, R., Friss de Kereki, C., **Study of Enterobacteriaceae from King George I.** [Estudio de la familia Enterobacteriaceae en la Isla Rey Jorge. Bahía Fildes, aguas interiores y fauna], *Montevideo. Instituto Antártico Uruguayo. Actividad scientífica 1986/87 (Scientific activity 1986-1987),* Jan. 1989, Vol.2, p.27-37, In Spanish with English summary. 17 refs.

DLC G845.A28

A study of Enterobacteriacea was conducted on King George I. from samples of sea water, fresh water, soil and fauna covering an area of 12 sq. km. All of the samples were processed by filter-membrane technique (0.45 micron). Identification was made of cultural, biochemical and tinctorial techniques. The following groups were isolated: Klebsiella, Escherichia, Edwardsiella, Salmonella and Yersinia. (Auth. mod.)

B-52966

Dragonetti, J.P., Barreiro, D., Güida, G., Regusci, R., Friss de Kereki, C., **Study of Enterobacteriaceae from Lake Uruguay** [Estudio de la familia Enterobacteriaceae en el Lago Uruguay, 62°11'S - 58°53'W, Isla Rey Jorge, Antártida], *Montevideo. Instituto Antártico Uruguayo. Actividad scientífica 1986/87 (Scientific activity 1986-1987),* Jan. 1989, Vol.2, p.39-41, In Spanish with English summary. 17 refs.

DLC G845.A28

A study of Enterobacteriaceae was conducted in water and lime samples obtained from Lake Uruguay in Apr. 1987 through pack ice 50 cm thick to prevent contamination. Four genera were identified: Klebsiella, Enterobacter, Shigella and Yersinia. The samples were processed by microfiltration (0.45 micron); the identification was made by biochemical reactions.

B-52967

Alvarez Cotelo, B.J., Fros Fros, T.A., Toyos Romay, M., Puig Bur, J.E., **Eco-ethological variables in a penguin rookery on Ardley I. 2** [Estudio de algunas variables eto-ecológicas en una pingüinera de las Islas Shetland del Sur - Isla Ardley], *Montevideo. Instituto Antártico Uruguayo. Actividad scientífica 1986/87 (Scientific activity 1986-1987),* Jan. 1989, Vol.2, p.43-50, In Spanish with English summary. 12 refs.

DLC G845.A28

As a continuation of a previous study trying to determine zootechnical norms which would allow the harmonious cohabitation of penguins and humans, two variables were considered in the present work: effects on penguins caused by industrial noise, and effects caused by nest transfer. No noticeable differences in number and weight of chicks and eggs were observed in the first variable, and no negative effects were observed in the second.

B-52968

Grillo, B., Terra, F., Alallón, W., Gallo, J., Gugliucci, A., Purriel, J., **Effects of natural diet, with cholesterol overload, on lipid metabolism of penguins** [Efecto de la dieta natural, con sobrecarga de colesterol sobre el metabolismo lipídico en los pingüinos], *Montevideo. Instituto Antártico Uruguayo. Actividad scientífica 1986/87 (Scientific activity 1986-1987),* Jan. 1989, Vol.2, p.51-56, In Spanish with English summary. 31 refs.

DLC G845.A28

The authors studied a group of 8 penguins, 4 of which were fed their natural diet based on fish, and the other four with the same diet and a cholesterol supplement. Biochemical studies of lipid metabolism were performed on serum, arteries and liver. A decrease of total cholesterol due to low levels of HDL fraction, from 0.92 g/l to 0.59 g/l, was found. A rise in cholesterol level of arterial homogenates was found, a difference which could not be demonstrated in liver homogenates. Histopathological studies of the whole vascular tree did not show any signs of atherosclerotic lesions. The putative protective action on the arterial wall of omega 3 polyunsaturated fatty acids present in fish is discussed, considering their possible role on lipid metabolism in the liver as well. (Auth. mod.)

B-52980

Neale, P.J., Priscu, J.C., **Photosynthetic apparatus of phytoplankton from a perennially ice-covered antarctic lake: acclimation to an extreme shade environment,** *Plant and cell physiology,* Mar. 1995, 36(2), p.253-263, Refs. p.261-263.

Phytoplankton in perennially ice-covered Lake Bonney are exposed to a limited range of light variation both in terms of intensity and spectral distribution (blue-green) during the austral spring and summer. This relative constancy is due to continuous sunlight, optical filtering through the 4.2 m ice cap and an absence of vertical mixing. The effects of this unique light environment on the structure and function of the photosynthetic apparatus were studied using measurements of P_{700} reaction center content and spectral variation in photosystem II (PSII) fluorescence kinetics. A sample from the deep (17 m) layer dominated by *Chlamydomonas subcaudata* was grown in enriched culture media. PSII fluorescence kinetics were measured on thylakoid preparations in the presence of DCMU under blue-green (481 nm) and red (660 nm) light. *C. subcaudata* utilized blue-green light for photosynthesis more efficiently than the photobiologically well-characterized *C. reinhardtii* (strain CC-124). These results, together with pigment analyses, suggest that carotenoids in Lake Bonney phytoplankton are more important in light harvesting as opposed to photoprotection. (Auth. mod.)

B-52990

Viarengo, A., Canesi, L., Garcia Martinez, P., Peters, L.D., Livingstone, D.R., **Pro-oxidant processes and antioxidant defence system in the tissues of the antarctic scallop *(Adamussium colbecki)* compared with the Mediterranean scallop *(Pecten jacobaeus)*,** *Comparative biochemistry and physiology,* May 1995, 111B(1), p.119-126, Refs. p.125-126.

Antioxidant defences (scavengers, enzymes), pro-oxidant processes *(in vitro* NAD(P)-dependent iron/EDTA-mediated hydroxyl radical (·OH) production and susceptibility to lipid peroxidation) were investigated in the tissues of the antarctic scallop *Adamussium colbecki* (Smith, 1902) compared with a scallop species typical of temperate Mediterranean waters, *Pecten jacobaeus* L. Levels of free radical scavengers and activities of antioxidant enzymes were in the same range in both species and in both were higher in digestive gland than gills. The *in vitro* potential for ·OH production was higher in the digestive gland than the gills for both species, consistent with the former tissue's higher levels of antioxidant defences. Inhibition studies of *A. colbecki* indicated the involvement of superoxide anion radical and hydrogen peroxide in ·OH formation. The digestive gland of *A. colbecki* showed a lower susceptibility to *'in vitro'* stimulated lipid peroxidation than that of *P. jacobaeus.* (Auth. mod.)

B-52994

Ledoyer, M., **Mysidacea (Crustacea) from Kerguelen, Crozet and Bouvet islands collected between 1972 and 1982** [Mysidacés (Crustacea) de Kerguelen, Crozet et Bouvet (Océan Austral) récoltés par la Japonaise, le Marion-Dufresne (1972-82) et dans des contenus stomacaux d'oiseaux], *Journal of natural history,* May-June 1995, 29(3), p.601-618, In French with English summary. Refs. p.616-618.

This study deals with Mysidacea (Crustacea) collected during the cruises organized by T.A.A.F. (Terres Australes et Antarctiques Françaises) between 1972 and 1982 in the Subantarctic, off Bouvet, Marion, Prince Edward, Crozet, Kerguelen and Heard islands. In spite of the large numbers of samples taken between the littoral and 2000 m, with various bottom sampling gears, only 8 species were caught. At the Kerguelen Is., the genus *Mysidetes,* with 2 species including *M. morbihanensis* n.sp., was the main constituent of the benthic littoral mysidacean fauna, while *Boreomysis inermis* was the main bathyal species. The analysis of stomach contents of birds indicates that some bathypelagic mysidacean species ascend to the surface layer. (Auth.)

B-52995

Wiese, K., Ebina, Y., **Propulsion jet of *Euphausia superba* (antarctic krill) as a potential communication signal among conspecifics,** *Marine Biological Association of the United Kingdom. Journal,* Feb. 1995, 75(1), p.43-54, 22 refs.

The propulsion jets of swimming *Euphausia superba, Meganyctiphanes norvegica* (nordic krill) and *Leander adspersus* were recorded by pressure-sensitive microphone while tethered. The propulsion jets show peaks and troughs in pressure in parallel to the period of beat of swimmerets, and show pressure pulses in fixed multiples of the beat frequency. The spectra typically display a beat frequency together with one to three harmonics.

B-52996

Huin, N., **Diving depths of white-chinned petrels,** *Condor,* Nov. 1994, 96(4), p.1111-1113, 23 refs.

For many seabirds, the ability to submerge to capture prey is a key adaptation for their foraging behavior. With the exception of the highly specialized Pelecanoididae, the Procellaridae (petrels and shearwaters) are the best adapted of the Procellariiformes for diving. Species in this family may dive as deep as 20 m. This paper reports the first systematic quantitative data on diving depths for any species of petrel. Fieldwork was carried out at Bird I., South Georgia between Mar. 7-28, 1993, approximately half-way through the chick-rearing period. Seventeen capillary gauges were attached to adult birds that had returned to feed their chicks.

B-52997

Nordhausen, W., **Studies on antarctic euphausiids,** San Diego, University of California, 1993, 225p., University Microfilms order No. 94-22610, Ph.D. thesis. Refs. p.189-196.

This dissertation consists of 5 independent chapters, each of which addresses an aspect of euphausiid biology. Ch. 2 describes the mesoscale distribution of *Thysanoessa macrura,* a common but infrequently studied species, and compares its growth rates in regions of distinctly different phytoplankton productivity. The research discussed in Ch. 3 was directed specifically at a region of extraordinarily high primary production, Gerlache Strait, and was designed to resolve small-scale spatial variability. In particular, *T. macrura* larval abundances and distributions with respect to phytoplankton productivity were studied. The fourth chapter describes the three most abundant euphausiid species in Gerlache Strait. This study was conducted during the austral winter, the season for which the least is known for any aspect of zooplankton biology. Ch. 5 compares acoustic measurements with more traditional net surveys of zooplankton biomass. The last chapter discusses the debated over-wintering strategy of antarctic krill. (Auth. mod.)

B-53003

Hirasawa, T., ed, NIPR Symposium on Polar Biology, 16th, Tokyo, Dec. 1-3, 1993, **Proceedings of the NIPR Symposium on Polar Biology, No.8,** Tokyo, National Institute of Polar Research, Jan. 1995, 211p., Refs. passim. For selected papers see B-53006 through B-53008, B-53012, B-53013, E-53009, E-53010, J-53004, J-53005 and J-53011.

This volume is a compilation of 17 full length papers and 23 abstracts (including extended abstracts), 10 of which are pertinent to Antarctica. The Symposium highlighted the "SIEFS (Sea Ice Ecology and Flux Study) Program in the Antarctic Areas" and "Antarctic Terrestrial Invertebrates under the Program of Yukidori Valley (SSSI) Study". The program of the Symposium and an author index conclude this volume.

B-53006

Rakusa-Suszczewski, S., **Flow of matter in the Admiralty Bay area, King George Island, maritime antarctic,** NIPR Symposium on Polar Biology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Jan. 1995, p.101-113, Refs. p.110-113.

Amounts of organic and inorganic matter in Admiralty Bay over the period of a year were calculated with data accumulated mainly by Polish scientists. The main routes of matter transport between the shore of Admiralty Bay and coastal and shelf waters are discussed in terms of physical forces, trophic relations, and fluctuations over long time scales. (Auth.)

B-53007

Yang, H.F., **Distributions of free amino acids in sea and lake ice cores from Antarctica with special reference to ice biota,** NIPR Symposium on Polar Biology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Jan. 1995, p.114-125, 27 refs.

Dissolved free amino acids (DFAA) of sea ice cores and lake ice cores collected from the vicinity of Davis Station were determined by HPLC. DFAA analysis showed that concentrations of total DFAA in ice cores were higher than those in water and they varied from 8.0 to 30.9 μM and 14.0 to 45.0 μM in the sea and lake ice cores, respectively. The highest concentration of total DFAA in the sea ice core appeared at 150 cm depth, while that in the lake ice core was found at 60-70 cm depth. The relative compositions of individual amino acids, such as serine, histidine and ornithine, were similar in both types of ice cores. These DFAA were probably derived from metabolism of the dominant organisms in the algal assemblage ice community. (Auth.)

B-53008

Men'shenina, L.L., Mel'nikov, I.A., **Under-ice zooplankton of the western Weddell Sea,** NIPR Symposium on Polar Biology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Jan. 1995, p.126-138, Refs. p.136-138.

Species composition, abundance, and seasonal dynamics of the under-ice zooplankton collected during the USA-Russia ISW-1 Expedition from the end of Feb. to the middle of May in 1992 in the western rim of the Weddell Sea Gyre are presented. Zooplankton were collected by a diver with plankton landing net directly from the under-ice surface (0 m layer) and at 5 m depth. Larvae and postlarvae of *Euphausia superba, Oithona similis, Stephos longipes, Paralabidocera antarctica, Pseudocyclopina belgicae, Microcalanus pigmaeus* and *Ctenocalanus citer* were the most abundant in both layers. Differences in the stage composition and abundance of these species between two layers (0 and 5 m) were found. *E. superba, S. longipes, P. antarctica* and *P. belgicae* were numerous near the under-ice surface and scarce at 5 m. *O. similis* density was greater at 5 m than at 0 m. *M. pigmaeus* and *C. citer* were comparatively greater in number at 5 m. Seasonal changes in abundance and stage structure of euphausiids and copepods are discussed. (Auth.)

B-53012

Hiruta, S., Ohyama, Y., **Preliminary report on terrestrial invertebrates in the Asuka Station area, Antarctica,** NIPR Symposium on Polar Biology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Jan. 1995, p.188-193, 9 refs.

As one of the main projects of the Japanese Antarctic Research Expedition, 1989 and 1990 surveys on terrestrial ecology were carried out in the Sør Rondane Mountains. During the 1990 survey, one springtail, four mites, some tardigrades and one nematode species were discovered in the area. The relation between soil properties and distribution of soil animals is briefly discussed. (Auth.)

B-53013

Nagashima, H., Matsumoto, G.I., Ohtani, S., Momose, H., **Temperature acclimation and the fatty acid composition of an antarctic green alga *Chlorella*,** NIPR Symposium on Polar Biology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Jan. 1995, p.194-199, 12 refs.

Antarctic green alga *Chlorella vulgaris* strain SO-26 cells cultured at 20°C photosynthesize between 0-35°C, with a maximum rate at 20°C, while cells cultured at 10°C show a shift of the optimum to about 2 to 3°C lower and show higher activity than cells cultured at 20°C. Mesophilic alga *Chlorella sorokiniana* strain C-133 cells cultured at 20°C photosynthsize between 5-45°C with a maximum rate at 35°C, while cells cultured at 10°C photosynthesize between 0-40°C with a maximum rate at 30°C, in a temperature range about 5°C lower than cells cultured at 20°C. Strain C-133 cells cultured at 20°C show higher photosynthetic activity than cells cultured at 10°C. In both strains tested the major fatty acids are palmitic, linoleic and linolenic acids. Results indicate that in photosynthesis the properties of an antarctic *Chlorella* SO-26 are more psychrophilic than those of mesophilic *Chlorella* C-133, and both strains can be acclimated by the culture temperature, at least partly because of fatty acid unsaturation. (Auth.)

B-53014

Kooyman, G.L., Kooyman, T.G., **Diving behavior of Emperor Penguins nurturing chicks at Coulman Island, Antarctica,** *Condor,* May 1995, 97(2), p.536-549, 35 refs.

General features of Emperor penguin foraging commutes were determined at the largest known Emperor penguin colony on Coulman I. The time selected for the study was one month before fledging, when maximum growth of the chicks occurs. Time/depth recorders were attached and retrieved from five adults as they departed from and returned to the colony. Nearly 16,000 dives were logged, of which 7,562 were estimated to be for foraging. Duration of the commutes averaged 14.9 days during which the birds averaged a total of 3,188 dives or 213 dives per day. Dives <200 m occurred at any time through the 24 hr cycle, while dives >400 m were restricted to 05:00 to 19:00 hr. The deepest dive was 534 m and the longest was 15.8 min to a depth <50 m. The modal depth of foraging dives was between 21 to 40 m, and the modal duration was between 4 and 5 min. It appears that the aerobic dive limit (ADL) of about 8 min is nearly twice the calculated ADL. If this is so, then <5% of all dives exceed the ADL. Diving efficiency derived from diving and surface time in relation to bottom time declines by 50% between 100 m and 300 m dives. (Auth. mod.)

B-53015

Wanless, S., Harris, M.P., Morris, J.A., **Factors affecting daily activity budgets of South Georgian shags during chick rearing at Bird Island, South Georgia,** *Condor,* May 1995, 97(2), p.550-558, 28 refs.

Radio telemetry was used to record daily activity budgets of 26 South Georgian Shags during the chick-rearing period at Bird I. There was a significant sex difference in the timing of feeding, with the female making the first trip of the day in 93% of pairs. On average, each shag made 2.3 trips/day and was absent for a total of 6.22 hr/day. The majority of time away from the colony was spent diving (86.7%), but long recovery periods on the surface between dives and time needed to travel to the seabed resulted in only 1.06 hr/day being potentially available for prey capture. Given that these activity data were collected during a season when feeding conditions were favorable, breeding shags at Bird I. appear to have little capacity to increase the time available for prey capture. Although South Georgian Shags exhibited the same sexually distinct foraging patterns as Antarctic

Shags at a colony on the Antarctic Peninsula, their activity budgets differed radically, with shags at Bird I. spending a much greater percentage of their time away diving (86.7% compared with 8.4%). (Auth. mod.)

B-53049

Priscu, J.C., Ward, B.B., Downes, M.T., **Water column transformations of nitrogen in Lake Bonney, a perennially ice-covered antarctic lake,** *Antarctic journal of the United States,* 1993, 28(5), p.237-239, 11 refs.

Permanently ice-covered Lake Bonney presents a special situation where turbulence and upper trophic levels are virtually nonexistent. A tentative calculation of nitrous oxide diffusion across the 20.5 m plane of the east lobe yields an upward flux of 1.2 mg nitrous oxide-nitrogen/sq m/d which equates to about 1.3 kg nitrous oxide-nitrogen/y. Preliminary measurements of nitrous oxide in the air above the lake ice on the east lobe revealed that they were about 40% greater than the global average for nitrous oxide, or that measured over nearby McMurdo Sound, indicating that nitrous oxide escapes from the lake despite a permanent ice cap. Although this is a small outward flux relative to the global annual production of nitrous oxide, it may have regional importance.

B-53050

Ward, B.B., Cockcroft, A.R., Priscu, J.C., **Nitrifying and denitrifying bacteria in Lake Bonney,** *Antarctic journal of the United States,* 1993, 28(5), p.239-241, 10 refs.

Nitrate (NO_3) is present in Lake Bonney in high concentrations in the east lobe of the lake, indicating that although the water column is apparently anoxic below the chemocline, denitrification does not occur. By contrast, nitrate is depleted in the anoxic bottom waters of the west lobe, indicating that denitrification does occur there. The distribution of bacterial activity in the east lobe measured by uptake of tritiated-thymidine shows a somewhat typical depth profile, in that it decreases with increasing depth and is almost undetectable at the chemocline. Thus, the peak in bacterial numbers does not coincide with the peak in heterotrophic activity, resulting in extremely low specific activity (activity per cell) below the chemocline. The authors suggest that denitrification occurs in the west lobe but not in the east lobe, and the difference is reflected in differences in the distribution of denitrifying bacteria and other indicators of denitrification between the two lobes.

B-53051

Woolston, C.D., Priscu, J.C., **Phytoplankton utilization of ammonium and nitrate in Lake Bonney: a preliminary assessment,** *Antarctic journal of the United States,* 1993, 28(5), p.241-243, 8 refs.

This report focuses on a preliminary assessment of the physiological capacity of planktonic assemblages for inorganic nitrogen uptake in the trophogenic zone of the east lobe of Lake Bonney. Specifically, the study provides estimates for the effects of substrate concentration on uptake kinetics as well as ambient uptake rates of inorganic nitrogen and carbon. The results provide preliminary insight into the interactions of nutrients and microplankton; furthermore, they set the groundwork for future investigations of nutrient cycling and primary production in the lake. In this report, the word uptake refers to transport plus assimilation, two distinct pathways which could not be distinguished by experimental designs. This preliminary study suggests that NH_4^+ is the primary nitrogenous nutrient supporting microplankton production above 20 m in Lake Bonney.

B-53052

Smith, J.J., Priscu, J.C., **Microbial respiration potential in Lake Bonney using a novel tetrazolium-reduction method,** *Antarctic journal of the United States,* 1993, 28(5), p.244-245, 6 refs.

In this study, 5-cyano-2,3-ditolyl tetrazolium chloride (CTC) was used to estimate the fraction of phytoplankton and bacterioplankton showing respiration potential at selected depths in both lobes of Lake Bonney. Total microbial numbers ranged between 10^5 and 10^6 per ml in both lobes at all depths. Results indicate that the fraction of microorganisms maintaining a low cellular reduction potential via respiration (using tetrazolium salt reduction as an indicator) is much lower in the west lobe than in the east lobe, particularly below 17 m. It should be noted that the CTC method yields the fraction of organisms showing respiration potential; absolute respiratory activity remains unknown.

B-53053

Bartlett, R.D., Priscu, J.C., Woolston, C.D., **Influence of high salinity levels on ambient inorganic nitrogen and nitrogen-15 extraction efficiency in Lake Bonney, Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.245-246, 4 refs.

Lake Bonney derives its primary hydraulic input from glacial streams during the austral summer. A wide variety of salts are introduced into the lake through this inflow. Because of continuous ablation and no outflow, salinities in Lake Bonney range from near 0 parts per thousand (ppt) below the ice cap to 247 ppt (nearly 7 times open ocean) at 35 m. The wide range of salinities prompted the authors to test extraction efficiencies of nitrogen and potential isotopic discrimination as a function of salinity. Such tests are necessary if accurate measurements of nitrogen transformations are to be obtained. It is shown that, when working in lakes of the dry valleys near McMurdo Sound, a number of preliminary experiments must be conducted for accurate extraction of various forms of inorganic nitrogen. If results from these experiments are not considered, sample analysis may be impossible or inaccurate results may occur.

B-53054

Wing, K.T., Priscu, J.C., **Microbial communities in the permanent ice cap of Lake Bonney, Antarctica: relationships among chlorophyll-*a*, gravel, and nutrients,** *Antarctic journal of the United States,* 1993, 28(5), p.247-249, 3 refs.

During previous studies on planktonic microorganisms in Lake Bonney, the authors observed a discolored layer of ice occurring at approximately mid-depth within the ice cap. This study presents results from an investigation of the components in that discolored ice layer, including chlorophyll-*a*, gravel weight, nutrient concentration, primary productivity, and bacterial activity. Microscopic examination of preserved samples from the ice cores revealed a preponderance of filamentous cyanobacteria morphologically similar to the genera *Oscillatoria* and *Phormidium.* Studies within the liquid water column of Lake Bonney have shown *Oscillatoria* to be a minor component of the photosynthetic planktonic community. The lake ice microalgae may be derived from the plankton within the lake or may originate from surrounding terrestrial communities which are dominated by filamentous cyanobacteria of the genus *Phormidium.*

B-53055

McKnight, D.M., Andrews, E.D., **Potential hydrologic and geochemical consequences of the 1992 merging of Lake Chad with Lake Hoare in Taylor Valley,** *Antarctic journal of the United States,* 1993, 28(5), p.249-251, 8 refs.

In late Jan. 1992, the authors observed that Lake Chad appeared to have merged with Lake Hoare. On Jan. 30 and Feb. 1, 1992, they studied the narrows area between the two lakes by making water-level measurements and collecting samples for analysis of major ions. A sample was also obtained above the lake bottom from a slush zone at a depth of 6.5 m at a site near the center of Lake Chad. On Jan. 30, 1992 they surveyed the water level in the moat areas from the north shore of both Lake Hoare and Lake Chad relative to the New Zealand benchmark NZARPBMT15 located between the two lakes. The water level for both lakes was 74.21 m above mean sea level. The authors interpret these measurements as showing that Lake Hoare is now at the same level as Lake Chad. Depending on the inflow from meltwater streams to either lake in the future, the hydrologic connection between the two lakes could go in either direction. The fact that the water in the transition zone between the lakes is most like Lake Chad water suggests that the average direction of flow is from Lake Chad to Lake Hoare.

B-53056

Ocampo-Friedmann, R., Friedmann, E.I., **Biologically active substances produced by antarctic cryptoendolithic fungi,** *Antarctic journal of the United States,* 1993, 28(5), p.252-254, 9 refs.

The most widespread of the microbial communities in the mountainous desert areas of the McMurdo Dry Valleys is the cryptoendolithic lichen-dominated community; results of laboratory studies with these cultures are reported. All of the nearly 40 fungal strains tested produced biologically active substances that inhibited the growth of algae and cyanobacteria of the parent community. The strains of cryptoendolithic fungi used in this study were isolated from the upper zone of the microbial community. Cryptoendolithic algae and cyanobacteria were also studied.

The green alga *Trebouxia* is a photobiont in lichen associations. *Hemichloris antarctica* Tschermak-Woess and Friedmann, a characteristic component of the lichen-dominated community, is a nonlichenized endemic green alga. In colonized rocks it forms a green zone immediately below the lichen zone. The cyanobacterium *Chroococcidiopsis* sp. is often present in the lower levels of the green zone, although the number of cells is generally small.

B-53079

Drewry, D.J., ed, Laws, R.M., ed, Pyle, J.A., ed, Royal Society of London, **Antarctica and environmental change. Proceedings of a Royal Society Discussion Meeting held on 20 and 21 May 1992,** Oxford, Royal Society Clarendon Press, 1993, 137p., For previous publication of articles see A.B. Vol.21, Nos. 48258-48271.

DLC QC981.8.C5A55

The contents of this volume consist of the reproduction of 14 articles first published in Philosophical Transactions of the Royal Society of London, series B, Vol.338(1285), Nov. 30, 1992, pages 201-334.

B-53082

Döhler, G., Hoffmann, M., Stappel, U., **Pattern of proteins after heat shock and UV-B radiation of some temperate marine diatoms and antarctic *Odontella weissflogii*,** *Botanica acta,* Apr. 1995, 108(2), p.93-98, Refs. p.97-98.

Synthesis of stress proteins after heat shock and different periods of UV-B radiation were investigated with marine diatom species from the North Sea and the antarctic diatom *Odontella weissfloggii* from the Weddell Sea. Algae were grown in an artificial sea-water medium under controlled laboratory conditions. All the tested diatom species can produce heat shock proteins (HSPS) of the 70 kDa family by *in vivo* labelling with [^{35}S]-methionine. *O. weissflogii,* a species relatively insensitive to UV-B irradiance, did not synthesize UV-induced HSPS. In addition, a protein of 43 kDa was found after UV-B irradiance of the temperate *Odontella sinensis.* The temperate marine diatom *Thalassiosira rotula* synthesized 70 kDa and 57 kDa proteins after a heat shock and a UV-B exposure of 2 h, but a 40 kDa protein could not be detected, whereas a 60 kDa protein was found after 2 h UV-B exposure. The results are discussed in view of a possible adaptation of *O. weissflogii* to an enhanced UV dose. (Auth.)

B-53085

Domanov, M.M., **Seasonal changes in composition of suspended matter in Admiralty Bay, King George Island and South Shetland Islands,** *Studia i materialy oceanologiczne,* 1993, No.64, p.19-25, 6 refs.

Studies of suspended matter, primary production and biomass were carried out in surface waters of Admiralty Bay in the period between Feb. 1988 and Jan. 1989. The chemical elements Si, K, Fe, Al, Ca, Ti, and Mn in suspended matter were also under investigation. The total quantity of mineral suspended matter ranged from 0.14 at the end of May to 1.49 mg/l in Mar. The biomass of the phytoplankton in suspended matter ranged from 0.9 in May to 935 mg/m^3 in Feb. during the bloom. Variations in chemical composition were associated with ratio of the biogenic and the mineral part of suspended matter as well as with the inflow of matter from different sources on the shore. (Auth.)

B-53086

Szefer, P., Szefer, K., Pempkowiak, J., Skwarzec, B., Bojanowski, R., Holm, E., **Trace metal concentrations and inter-metal associations in antarctic mammals,** *Studia i materialy oceanologiczne,* 1993, No.64, p.103-109, Refs. p.108-109.

Zn, Cu, Cd, Pb, Ag, Ni, Co, Cr, Fe and Mn concentrations in some tissues of three species of seals *(Lobodon carcinophagus, Hydrurga leptonyx, Leptonychotes weddelli)* from the Antarctic were determined by the AAS method. Distinct inter-tissue differences in metal concentrations were observed. Livers of the seals contained maximal levels of Zn, Cu, Ag and Mn whilst kidneys revealed the highest levels of Cd, Ni and Co. Muscles were characterized by the lowest concentrations of all the elements analyzed. The metal levels in the vertebrates analyzed were comparable to the corresponding values reported for mammals from various aquatic areas. Significant correlations between levels of several metals were found. (Auth.)

B-53087

Bielecka, L., **Copepoda (Cyclopoida) from the Croker Passage (Antarctica, June-August, 1989),** *Studia i materialy oceanologiczne,* 1993, No.64, p.215-224, 18 refs.

Studies on planktonic material collected during the austral winter of 1989 in the Croker Passage are reported. The presence of 7 species of Cyclopoida was observed *(Oithona frigida, Oithona similis, Oncaea conifera, Oncaea curvata, Oncaea notopus,* and *Oncaea* spp.) The predominant species were *O. conifera* and *O. frigida.* In general, the genus *Oncaea* concentrated deeper in the water column than the genus *Oithona.* The structure of populations of the dominant Cyclopoida species show an asynchronous development. (Auth.)

B-53088

Sapota, M.R., **Observations on embryogenesis of *Notothenia neglecta* Nybelin in Admiralty Bay (King George Island, South Shetland Islands, Antarctica),** *Studia i materialy oceanologiczne,* 1993, No.64, p.283-289, 10 refs.

Embryos of *Notothenia neglecta* were collected in many development stages during year-long observations on abundance of ichthyoplankton in the upper hundred m layer of Admiralty Bay. The embryos were found in samples from late May to mid-Dec. They were present in the greatest number in June (up to 416 ind./25 x 10^3 m^3 at 5 m depth), then their number rapidly decreased and remained stable till the end of the year. Time of fertilization appears to be late May/June. During seven months of occurrence of embryos in Admiralty Bay, full embryogenesis was observed: hatching took place in Dec. All embryogenesis took place in the pelagic zone; the upper part of investigated layers was preferred. (Auth.)

B-53089

El-Mehlawy, M., Rokicki, J., Podolska, M., **Occurrence dynamics of *Eubrachiella antarctica* (Quidor, 1906) on *Dissostichus eleginoides* from South Georgia,** *Studia i materialy oceanologiczne,* 1993, No.64, p.291-296, 7 refs.

Infestation of antarctic fish *Dissostichus eleginoides* by the parasitic copepod *Eubrachiella antarctica* was studied. An attempt is made to relate the degree of infestation of *D. eleginoides* to body length and season of capture of the fish. (Auth.)

B-53098

Zhu, G.H., Wang, M., **Studies of nano- and microalgae in the adjacent waters of Antarctica. V. Distribution of freshwater algae in different habitats around Great Wall Station,** *Antarctic Research (Chinese edition),* Mar. 1995, 7(1), p.67-74, In Chinese with English summary. 16 refs.

This paper reports the species composition, distribution, ecotypes and similarities of freshwater algae from 5 different habitats around the Great Wall Station: water, snow, mud-sand of West Lake, snow covering penguin guano, and snow covering moss cushions. According to habitat or different mode of life, 50 taxa of 3 phyla in total are grouped into two ecotypes: water algae and terrestrial (snow) algae, or freshwater planktonic algae and freshwater benthic (epiphytic) algae. (Auth. mod.)

B-53099

Scientific Committee for the Conservation of Antarctic Marine Living Resources, **Report of the thirteenth meeting of the Scientific Committee, Hobart, Australia, 24-25 October, 1994,** Hobart, Tasmania, CCAMLR, 1994, 450p., Refs. passim.

This document presents the adopted record of the 13th meeting of the Scientific Committee for the Conservation of Antarctic Marine Living Resources held in Hobart, Australia, from Oct. 24-28, 1994. Major topics discussed include: krill, fish, crab and squid resources, ecosystem monitoring and management, marine mammal and bird populations, assessment of incidental mortality and management under conditions of uncertainty. Reports of Meetings and intersessional activities of subsidiary bodies of the Scientific Committee, including the Working Groups on

Krill, on Fish Stock Assessment, for the CCAMLR Ecosystem Monitoring Program and on Incidental Mortality Arising from Longline Fishing, are appended. (Auth.)

B-53100

Commission for the Conservation of Antarctic Marine Living Resources, **Report of the thirteenth meeting of the Commission, Hobart, Australia, 26 October-4 November, 1994,** Hobart, Tasmania, CCAMLR, 1994, 123p.

This document presents the adopted record of the 13th meeting of the Commission for the Conservation of Antarctic Marine Living Resources held in Hobart, Australia from Oct. 26-Nov. 4, 1994. Major topics include: review of the Report of the Scientific Committee; assessment and avoidance of incidental mortality of antarctic marine living resources; current operation of the Systems of Inspection and Scientific Observation; compliance with conservation measures in force; review of existing conservation measures and adoption of new conservation measures including catch limits for a number of species of finfish and for antarctic crabs; management under conditions of uncertainty; and cooperation with other international organizations including the Antarctic Treaty System. The Reports of the Standing Committee on Administration and Finance and the Standing Committee on Observation and Inspection are appended. (Auth.)

B-53107

Saiz Salinas, J.I., **Sipuncula of the southeastern Weddell Sea (Antarctica),** *Polar biology,* May 1995, 15(5), p.307-317, Refs. p.316-317.

Sipunculans collected during the EPOS (European *Polarstern* Study) leg 3 cruise (Jan. 13, 1989-Mar. 10, 1989) to the Weddell Sea shelf area from depths ranging from 186 to 2037 m are recorded. Seven species in three genera are recognized; *Nephasoma capilleforme* and *Phascolion convestitum* have not been recorded hitherto in Antarctica. Significant morphological characters as shown by light (LM) and electron (SEM) photographs are described and illustrated. Antarctic distribution maps of the species collected and a checklist of the sipunculan species south of the Antarctic Convergence with depths and bibliographic references are included. (Auth.)

B-53108

Powers, L.E., Freckman, D.W., Virginia, R.A., **Spatial distribution of nematodes in polar desert soils of Antarctica,** *Polar biology,* May 1995, 15(5), p.325-333, Refs. p.332-333.

The vertical and horizontal distribution of nematodes in polar desert soils was investigated at two field sites in Taylor Valley. Soil samples were collected from horizontal and vertical grids on the north and south shores of Lake Hoare. Nematodes were extracted, identified by genus and life-cycle stage, and enumerated. Nematodes occurred primarily at depths between 2.5 and 10 cm in the soil profile, and were less abundant at the surface (0-2.5 cm) and at 10-20 cm. Distribution along the horizontal grid was patchy. This aggregation may indicate favorable microhabitat sites for nematode growth and reproduction, and provide information about the potential influence of environmental parameters on nematode distribution and population structure in antarctic soils. (Auth.)

B-53109

Barnes, D.K.A., Clarke, A., **Seasonality of feeding activity in antarctic suspension feeders,** *Polar biology,* May 1995, 15(5), p.335-340, 23 refs.

The feeding activity of 4 benthic suspension-feeding groups (bryozoans, hydroids, polychaetes and holothurians) was monitored *in situ* every month for a 2-year period at Signy I. The bryozoans were monitored at species level, whereas the other taxa could be differentiated only as to genus. A marked seasonal variation in feeding activity was observed in most taxa. Although environmental parameters such as sea-water temperature, fast-ice duration and water column chlorophyll concentrations suggested that winter in the maritime Antarctic lasts for about 6 months, many animals cease feeding only for 2 or 3 months around the middle of the austral winter. These suspension feeders must therefore be efficient at utilizing the low concentration of microplankton existing in the water column for much of the year. Comparison with environmental variables suggested several possible cues for changes in feeding activity, but these cues may differ among taxa. (Auth.)

B-53110

Ohyama, Y., Hiruta, S., **Terrestrial arthropods of Sør Rondane in eastern Dronning Maud Land, Antarctica, with biogeographical notes,** *Polar biology,* May 1995, 15(5), p.341-347, 24 refs.

Five species of terrestrial arthropods have been found in Sør Rondane inland nunataks of eastern Queen Maud Land: one collembolan and four mite species. Their occurrence was restricted to the nunataks in the central and western parts of the region. The same was also observed for the visible vegetation, such as algae and mosses, near nesting-bird colonies. The maximum recorded population density was 859 arthropods/100 ml soil at Tanngarden, in the northwestern part of the region. The arthropod fauna of Sør Rondane is very similar to that of central Queen Maud Land, but different from that of the eastern region (Showa Station and Enderby Land). Different species of collembolans and oribatid mites occur at locations separated by the Lützow-Holm Bay and Shirase Glaciers, whereas prostigmatic mites do not show such a difference. (Auth.)

B-53111

Coria, N.R., Casaux, R., Favero, M., Silva, P., **Analysis of the stomach content of the blue-eyed shag *Phalacrocorax atriceps bransfieldensis* at Nelson Island, South Shetland Islands,** *Polar biology,* May 1995, 15(5), p.349-352, 22 refs.

Stomach contents of 40 specimens of the blue-eyed shag were sampled at Nelson I. in Jan. 1994. Analysis of the diet showed that fish were by far the main component, followed by octopods, polychaetes and gammarids. *Notothenia coriiceps* predominated in frequency (58%) and in weight (65%), whereas *Nototheniops nudifrons* was the most important species by number (47%). The comparison with data published on pellet analysis of shags from the same colony gave similar results. However, although the methodology used in the present study requires more time in the field, it reduces the errors that arise from the examination of regurgitated casts, such as those due to erosion by digestion or loss of the otoliths through the gastrointestinal tract. Observation of 8 nests filmed continuously during 24 h showed that the members of the pairs alternate foraging and make 3-5 foraging trips per individual per day. The activity started at 7AM and ended at 10PM. The mean duration of the trips was 73 min. (Auth.)

B-53125

Shears, J., **Environmental management in the Antarctic,** *NERC news,* Oct. 1992, No.23, p.28-29.

The author reports on the environmental impact of human activities on the Antarctic and the new laws for its protection.

B-53127

Hull, C., Carter, R., Whitehead, M.D., **Aspects of breeding chronology and success of the Antarctic Skua *Catharacta maccormicki* at Magnetic Island, Prydz Bay, Antarctica,** *Corella,* 1994, 18(2), p.37-40, 24 refs.

At Magnetic I., an east antarctic coastal site, the breeding timetable of Antarctic Skuas was similar to that reported from other sites. Breeding success ranged between 62 and 65% over the three seasons 1986-87, 1989-90 and 1990-91. This is high compared with most previous studies and seems related to a high Adélie penguin: Skua nesting number ratio and consequent high food availability. Most mortality was due to eggs being stolen by other skuas. (Auth.)

B-53128

Heyns, J., ***Plectus antarcticus* de Man, 1904 from western Dronning Maud Land, Antarctica,** *Nematologica,* 1995, 41(1), p.1-6, With French summary. 12 refs.

Plectus antarcticus de Man, 1904 is described from western Queen Maud Land, and compared with descriptions of this species by Timm (1971) and Kito et al. (1991). Sampling was conducted at Roberts Knoll during the 1991-92 summer, as part of the new South African antarctic terrestrial biology research program. This program aims to investigate the effects of ornithogenic products on ecosystem structure and functioning at inland nunataks in the northern Ahlmann Ridge. (Auth. mod.)

B-53167

Zhang, B.G., **Foraminifera from the surface sediments in the Great Wall Bay of King George Island, Antarctica,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.289-307, In Chinese with English summary. 30 refs.

Foraminifers were collected from the surface sediments in the Great Wall Bay of King George I. by the 4th Chinese Antarctic Expedition (1987-88). Thirty species belonging to 21 genus are described and illustrated; among them the dominant species are *Portatrochammina antarctica* (Parr), *Bolivina pseudopunctata* Höglund, *Stainforthia vestfoldensis* (Crespin), *Cassidulinoides parkerianus* (Brady), *Miliammina earlandi* Loebich et Tappan, and *Globocassidulina biora* (Crespin). Three new species were found, *Spiroplectella changchengensis* sp. nov., *Portatrochammina gracilis* sp. nov., and *Portatrochammina porata* sp. nov. (Auth. mod.)

B-53169

Gou, Y.X., **Record of ostracoda from the Great Wall Bay of King George Island, Antarctica,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.319-327, In Chinese with English summary. 15 refs.

Ostracods were collected from bottom samples at 20 m depth and 65 m depth in the Great Wall Bay of King George I. The ostracods include a few podocopids, such as *Hemicytherura reticulata* Hartmann, *Hemicytherura* sp. 1, *Hemicytherura* sp. 2 juv., *Xestoleberis* sp. together with other juvenile ostracode valves. The appearance of *H. reticulata* Hartmann is significant to the discussion of the relationship between the high antarctic ostracode faunas and the faunas from cold temperate regions. *H. reticulata* is first described in 1962 from Magellan Strait, then is reported in 1988 from littoral, sublittoral and eulittoral areas of Tierra del Fuego, East Falkland and from Puerto Deseado, Province of Santa Cruz, Argentina. *Patagonacythere devexa* (Müller) is a common species both in high and low antarctic regions, especially in the shallow water shelf, but it is also recorded as *Aurila frequens* from Magellan Strait. The occurrence of these two species both in high antarctic regions and southern South America seems to show a weak link between the high antarctic ostracode faunas and the cold temperate one. (Auth. mod.)

B-53171

Cheshire, A.C., Conran, J.G., Hallam, N.D., **Cladistic analysis of the evolution and biogeography of *Durvillaea* (Phaeophyta),** *Journal of phycology,* Aug. 1995, 31(4), p.644-655, 41 refs.

The genus *Durvillaea* currently has four recognized species found along many exposed rocky coastlines of the temperate to subantarctic regions in the Southern Hemisphere. It is proposed that the current species distributions are related primarily to vicariance events and subsequent speciation associated with the breakup of Gondwana between 40 and 100 Ma. From an ancestral species, a stipitate species developed in the Tasman basin, with separation and speciation resulting in the *D. potatorum/D. willana* complex in southeastern Australia and New Zealand. A second line of evolution led to *D. chathamensis* and *D. antarctica,* characterized by a honeycombed medulla. The extensive distribution of *D. antarctica* throughout the Southern Hemisphere is related to both vicariance and dispersal events. The status of *D. chathamensis* as a species distinct from *D. antarctica* is questioned. The affinities of an as yet undescribed taxon from the Antipodes Islands are thought to be with the *D. potatorum* complex but require further study before they can be defined more precisely. (Auth.)

B-53184

Moore, P.G., MacAlister, H.E., Taylor, A.C., **Environmental tolerances and behavioural ecology of the sub-antarctic beach-hopper *"Orchestia" scutigerula* Dana (Crustacea: Amphipoda) from Husvik, South Georgia,** *Journal of experimental marine biology and ecology,* June 28, 1995, 189(1+2), p.159-182, Refs. p.180-182.

"Orchestia" scutigerula Dana (Amphipoda: Talitridae) has been found beneath supralittoral stones at Kanin Point, South Georgia. Microhabitat temperatures recorded over 6 summer weeks varied widely, especially under stones highest upshore. In air, *O. scutigerula* tolerated temperatures between -2 and 19°C. Temperatures between 19 and 28°C were survivable only in fully saturated air. In water, a temperature of 19°C was tolerated for 6 h. The locomotory behavior (walking) of amphipods for 3 h underwater was the same in distilled water as seawater. All individuals tested survived any combination of salinity and temperature between 5 and 34 per mill and 2 and 12°C. Amphipods preferred shaded conditions both in air or in water, moist to dry gravel, and moist gravel to moist sand. Feeding trials revealed high consumption of rotting tussock grass debris and green algae *(Ulothrix, Ulva).* Soft materials were consumed preferentially. Rate of passage of food through the gut was variable, both within and between individuals. Underwater, *O. scutigerula* fed at half the rate in air. Food preferences of individuals sometimes switched between equally available foods over time. Fecundity is linearly related to female body length. Eggs more than double in volume during development. (Auth. mod.)

B-53185

Mordy, C.W., Penny, D.M., Sullivan, C.W., **Spatial distribution of bacterioplankton biomass and production in the marginal ice-edge zone of the Weddell-Scotia Sea during austral winter,** *Marine ecology progress series,* June 1995, 122(1-3), p.9-19, 58 refs.

To help elucidate the ecological and biogeochemical significance of bacterial production in winter, the distributions of bacterial biomass and production in the MIZ of the Weddell-Scotia Sea in austral winter 1988 were examined as part of the Antarctic Marine Ecosystem Research at the Ice-edge Zone (AMERIEZ) program. Measurements were made along 3 rapid transects providing a synoptic view of the MIZ. Transects were oriented normal to the ice edge with stations extending up to 100 km into the pack and several hundred km seaward of the ice edge. Winter distributions of bacterial biomass and production were more closely related to local hydrography than to microalgal distributions or the proximity of the ice edge. Bacterial characteristics were highest within or in the proximity of warm-core eddies, enrichments which may have resulted from prior ice melt or from advection of more productive waters. (Auth. mod.)

B-53199

Slattery, M., McClintock, J.B., **Population structure and feeding deterrence in three shallow-water antarctic soft corals,** *Marine biology,* May 1995, 122(3), p.461-470, 60 refs.

Alcyonium paessleri and *Clavularia frankliniana* are soft corals in the nearshore benthic communities of eastern McMurdo Sound. They are much less abundant in western McMurdo Sound where a third species, *Gersemia antarctica,* co-occurs in low numbers. The body tissues of these three species are comprised mainly of organic material which is primarily derived from NaOH-soluble protein and refractory material. The mean biomass per individual is 1.81, 0.008, and 45 g dry wt for each respective species. Based on species population densities, the population energetic densities are estimated to be 210.1, 185.1, and 26.1 kJ/m^2. Despite the relatively rich energetic content of the tissue and apparent vulnerability to predators, very little predation occurs on these soft corals. The results indicate that these antarctic soft corals contain bioactive compounds which deter common predatory seastars and fishes. (Auth. mod.)

B-53211

Halloran, B.A., Donachy, J.E., **Characterization of organic matrix macromolecules from the shells of the antarctic scallop, *Adamussium colbecki*,** *Comparative biochemistry and physiology,* June 1995, 111B(2), p.221-231, 70 refs.

The highly acidic soluble organic matrix (SM) isolated from shells of this antarctic scallop consists of 1.5% carbohydrate and 12.8% phosphate by weight. Total SM is composed of approximately 31% Asx, 29% Ser, and 18% Gly. Separation of the SM using RP-HPLC yielded a minimum of 6 protein fractions, labeled RP-1 through RP-6 in order of elution off the column. The first fraction, RP-1, was an effective inhibitor of calcium carbonate crystal nucleation *in vitro,* suggesting a role for this protein in the regulation of shell mineralization. A less acidic fraction, RP-3, showed less inhibitory activity and dephosphorylation of RP-1 resulted in almost complete loss of inhibitory activity. Automated Edman degradation was used to sequence peptides generated by chemical cleavage of RP-1. The data suggest biochemical similarities between this SM and other SM proteins isolated from both calcium carbonate and calcium phosphate biominerals, and present evidence of a primary domain structure similar to that described for oyster SM and phosphophoryn isolated from rat dentin. (Auth. mod.)

B-53212

Singer, W.D., Parker, S.K., Himes, R.H., Detrich, H.W., III, **Polymerization of antarctic fish tubulins at low temperatures: role of carboxy-terminal domains,** *Biochemistry,* Dec. 27, 1994, 33(51), p.15,389-15,396, 50 refs.

A previous proposition holds that the efficient polymerization of tubulins from antarctic fishes at low physiological temperatures (-1.8 to +2°C) may result in part from adaptations located in their carboxy-terminal (C-terminal) tails. To test this hypothesis, examinations were made of the polymerization of such tubulins so modified or by neutralization of carboxyl groups. Addition of subtilisin to low concentrations of *Notothenia coriiceps* tubulin induced a biphasic assembly reaction: stage I produced $\alpha\beta_s$ dimers, and stage II yielded $\alpha_s\beta_s$. Both stage I and stage II polymers consisted of protofilament sheets and microtubules with attached sheets. The critical concentration for assembly of the stage II polymer was at least 10-fold lower than that of untreated tubulin. Neutralization of Glu and Asp carboxyl groups by the incorporation of glycine ethyl ester (GEE) moieties produced a tubulin, modified largely in its C termini. The results suggest that the C termini of antarctic fish tubulin are not major loci for cold adaptation of microtubule assembly. (Auth. mod.)

B-53233

Greenfield, L., **Thermophilic fungi and actinomycetes from Mt. Erebus and a fungus pathogenic to *Bryum antarcticum* at Cape Bird,** *New Zealand antarctic record,* 1983, 4(3), p.10-11.

The author gives a brief report on the isolation and partial characterization of some thermophilic fungi and actinomycetes from Mt. Erebus. The soil samples were collected at Cape Bird. Several more fungi in addition to those isolated at Cape Bird have been isolated. They seem to be thermotolerant rather than true thermophiles and are members of the Paecilomyces and Aspergillus groups. The thermophilic fungi have been classified into the Penicillium, Chaetomium, and Mucor groups. The Penicillium isolate is non-pigmented.

B-53234

Barnes, D.K.A., **Seasonal and annual growth in erect species of antarctic bryozoans,** *Journal of experimental marine biology and ecology,* May 26, 1995, 188(2), p.181-198, Refs. p.195-198.

Seasonal and annual growth was monitored *in situ* at Signy I. in two species of bryozoan of different growth morphologies, using photographic and tagging techniques. *Cellarinella watersi,* a heavily calcified species, exhibited marked seasonality of zooidal production, leading to the formation of annual skeletal growth check lines. These growth checks allowed colony age to be determined, and individual colony growth history to be studied. *Alloeflustra tenuis* appeared to grow without obvious seasonality, despite seasonal variation in many environmental factors, to a maximum age of about 26 years. The amount of organic growth (ash-free dry mass) per year was very similar in the two species, although there were large differences in dry mass because of differences in skeletal investment. The maximum size obtained by the rigidly erect *C. watersi* in shallow waters appeared to be limited by current damage. It is possible that in all these bryozoans, maximum age (and size) is limited in the long term by frequency of iceberg impact. (Auth. mod.)

B-53241

Wojciechowska, A., **New species of the genus *Phyllobothrium* (Cestoda, Tetraphyllidea) from antarctic batoid fishes,** *Acta parasitologica Polonica,* 1991, 36(2), p.63-68, 11 refs.

Four new species of cestodes of the genus Phyllobothrium from batoid fishes from the environs of the South Shetlands and South Georgia are described. Each of them is host specific. They are characterized by: a spherical scolex bearing 4 leaf-like sedentary bothridia with folded surfaces or margins; apical suckers; numerous testes; dilation in the proximal part of the vagina and in the distal partended by a sphincter; and the presence of a lobe bearing openings of the male genital system, not extruding from the genital atrium. (Auth. mod.)

B-53242

Wojciechowska, A., **Some tetraphyllidean and diphyllidean cestodes from antarctic batoid fishes,** *Acta parasitologica Polonica,* 1991, 36(2), p.69-74, 17 refs.

Descriptions of two new species of Tetraphyllidea: *Marsupiobothrium antarcticum* sp. n. and *Pseudanthobothrium minutum* sp. n. are given. The third species of this order is described as *Anthobothrium* sp. A new species, *Echinobothrium acanthocolle* sp. n., is also described; this is the first representative of the order Diphyllidea recorded from the Antarctic. (Auth.)

B-53248

Gröhsler, T., **Feeding habits as indicators of ecological niches: investigations of antarctic fish conducted near Elephant Island in late autumn/winter 1986,** *Archive of fishery and marine research,* 1994, 42(1), p.17-34, With German and French summaries. Refs. p.32-34.

The stomach contents of 18 fish species caught in the late autumn/winter of 1986 near Elephant I. using bottom trawls from on board the FS *Polarstern* (ANT V/1) were investigated using the method of cluster analysis. These analyses have led to a good description of food niches. Trophic types found in this region were plankton, plankton/benthos, benthos/plankton or nekton feeders as well as benthos feeders. Each of these trophic types is represented in the family of the Nototheniidae, including 8 species in this investigation. Interspecific competition among the fish species studied appears to be reduced owing to the vertical structure of their habitat. Food distribution overlap is only slight among fish species with similar feeding styles and behaviors, although krill is almost always an important component of the food supply. (Auth.)

B-53249

Oppenheim, D.R., **Taxonomic studies of *Achnanthes* (Bacillariophyta) in freshwater maritime antarctic lakes,** *Canadian journal of botany,* Dec. 1994, 72(12), p.1735-1748, With French summary. Refs. p.1745-1746.

Eleven species of *Achnanthes* from Signy I. are described, including one new species. Benthic algal material from a range of shallow lakes of varying trophic status was examined by light microscopy and scanning electron microscopy. Detail of morphology is provided with an overview of the taxonomic literature for each species. In all cases source descriptions are cited, and where possible holotype and lectotype material was examined. The variation between populations inhabiting different lakes is considered. An examination of the geographical distribution of *Achnanthes* in southern latitudes from the literature confirms numerous records of widespread occurrence in freshwater environments in sub-antarctic regions but not from higher latitudes. (Auth.)

B-53252

Ernsting, G., Block, W., MacAlister, H.E., Todd, C., **Invasion of the carnivorous carabid beetle *Trechisibus antarcticus* on South Georgia (sub-Antarctic) and its effect on the endemic herbivorous beetle *Hydromedion sparsutum*,** *Oecologia,* July 1995, 103(1), p.34-42, 39 refs.

Recently two species of carabid beetle were accidentally introduced onto the subantarctic island of South Georgia. Both species are carnivorous and flightless. One of the species, *Trechisibus antarcticus,* is locally very abundant and in the process of invading the coastal lowland area, where the endemic herbivorous beetle *Hydromedion sparsutum* (Perimylopidae) is common. Field samples showed the abundance of the endemic species to be much lower and its adult body size to be larger in carabid-infested locations than in carabid-free locations. The sample data allowed the authors to estimate the growth rate of the *H. sparsutum* larvae and to reconstruct the most likely life-cycle of both species. A laboratory experiment showed a high mortality for the first three (out of six) larval instars of *H. sparsutum* in groups which had been subjected to predation by *T. antarcticus.* The duration of the period during which the larvae are vulnerable to predation was shown in a growth experiment to depend on food type. (Auth.)

B-53254

Willen, E., ***Archilaophonte maxima* gen.n., spec.n., a new taxon of the Laophontidae (Copepoda, Harpacticoida) from the high Antarctic (Weddell Sea),** *Hydrobiologia,* Apr. 14, 1995, 302(3), p.241-255, 12 refs.

Male and female of a new genus and species of the family Laophontidae, *Archilaophonte maxima,* are described. The specimen was found in the Weddell Sea and appears to be the most primitive genus up to now within the superfamily Laophontoidea as defined by Huys (1990). Based on its setation of legs and mouth parts, however, it can be placed unequivocally into the family Laophontidae. *A. maxima* gen. n. shows close affinities to the laophontid genus *Esola* Edwards, 1891. Both genera form a monophyletic group which is interpreted here as the first and most primitive offshoot in the evolution of the Laophontidae. The synapomorphies of the former lineage are the shape of the protopodite of the P1 and shape and setation of the female P5. (Auth.)

B-53257

Heywood, R.B., ed, British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992, **University research in Antarctica, 1989-92,** Cambridge, British Antarctic Survey, 1993, 153p., Refs. passim. For individual papers see B-53266 through B-53268, B-53271 through B-53275, E-53265, E-53270, F-53261 through F-53264, I-53259, I-53260, I-53269 and K-53258 or 49-5881 through 49-5886.

This volume presents 18 contributions to the symposium covering the following areas of interest: the inner magnetosphere; atmospheric processes; ice sheets, ice shelves and blowing snow measurements and models; paleotemperature records and environmental monitoring from high-latitude mollusc skeletal chemical composition; the paleoceanography of the Weddell Sea; adaptation in antarctic organisms; microplankton lipid composition and nutrition of krill; and antarctic fish growth and metabolism.

B-53266

Marshall, J.D., Pirrie, D., Nolan, C., **Oxygen stable isotope composition of skeletal carbonates from living antarctic marine invertebrates,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.81-84, 9 refs.

Skeletal carbonate samples from four living invertebrate species from Signy I. were analyzed, and the results compared with the composition of the seawater in which the carbonates were precipitated. The results suggest that the skeletal carbonate was precipitated during summer conditions of elevated temperature and reduced salinity due to meltwater runoff. However, the data may also suggest minor biogenic fractionation of the oxygen isotopes, assuming that the widely used palaeotemperature equations are applicable for cool water skeletal carbonates. Temperature values calculated using the standard paleotemperature equation and the measured oxygen isotope values gave higher temperatures than those measured at Signy I. These data suggest that cold paleotemperatures may be poorly recorded in the geological record. (Auth. mod.)

B-53267

Bryer, C., **Growth lines of high latitude bivalves: implications for environmental monitoring,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.85-90, 22 refs.

The antarctic protobranch mollusc *Yoldia eightsi* (Couthouy) was examined for both internal and external growth lines. First order or biannual increments were apparent in acetate peel replicas but were best resolved using an enzyme mediated proteolysis to highlight the growth lines. Removal of the periostracum exposed an almost continuous sequence of 1st to 4th order growth lines when examined with an SEM. External growth line data from a pooled sample of six individuals were examined for periodicities using spectral techniques, and showed a number of periodicities, the most prominent being at 75-80 'days', fitting the two phases of growth of *Yoldia.* The technique of examining external growth lines was applied to the late Eocene mollusc *Eurhomalea antarctica* (Dextrase & Zinsmeister 1987) which reveals a major periodicity between 48 and 50 'bands'. This provides possible evidence for the proposed short growing season for this animal. (Auth. mod.)

B-53268

Jones, V.J., **Use of diatoms in lake sediments to investigate environmental history in the maritime Antarctic: an example from Sombre Lake, Signy Island,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.91-95, Refs. p.94-95.

A 2.52 m sediment sequence from Sombre Lake was analyzed. Results of diatom analysis show that the modern diatom flora of the lake is atypical compared with other post-glacial assemblages in Sombre Lake. This suggests that present day water quality is unusual; this is probably due to the recent influence of fur seals, which have caused nutrient enrichment of the lake. The study demonstrates the potential of a palaeolimnological approach to study environmental change in the maritime Antarctic. (Auth.)

B-53271

Foister, G.G., Wynn-Williams, D.D., Burns, R.G., **Microbial community dynamics and enzyme activity of an antarctic fellfield soil during the austral summer,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.109-117, Refs. p.116-117.

Microbial and enzymatic activities were measured during the 49-day austral summer of 1991 in two fellfield soil polygons (WW-5 and WW-18) at Signy I. In 0-2.5 cm cores, microbial counts of bacteria and yeasts increased 100-fold during the summer in both polygons, but fungal numbers increased only in WW-18. The phosphatase activity of both polygons increased but there was no consistent trend in other enzyme activities. In a second experiment, 0-8 cm soil cores collected at day 14 were divided into 0-4 cm and 4-8 cm fractions. Phosphatase activity in the 0-4 cm fraction of WW-18 was twice that in the 4-8 cm fraction. β-D-Galactosidase was detected in the 4-8 cm fraction of both WW-5 and WW-18 but not in the 0-4 cm fraction whilst β-D-Glucosidase activity was only detected in the 0-4 cm fraction of WW-5. In both polygons carbohydrate carbon was 1.5 x greater in the 0-4 cm fraction compared with the 4-8 cm fraction. The bacteria and yeast populations of WW-18 were approximately 1000 x greater in the 0-4 cm than in the 4-8 cm fraction. There was no change in the fungal population of WW-18 with depth but populations in WW-5 were approximately 165 x greater in the 4-8 cm fraction compared with the 0-4 cm fraction. (Auth. mod.)

B-53272

Montiel, P.O., Cowan, D.A., **Possible role of soluble carbohydrates and polyols as cryoprotectants in antarctic plants,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.119-125, 35 refs.

Evidence has been obtained for the presence and active accumulation of water-soluble carbon compounds in four species representative of the major plant groups occurring in maritime Antarctica. Samples were subjected under illumination to a range of temperatures for periods of up to 120 h. With the exception of *D. uncinatus,* net accumulation of low molecular weight carbohydrates and polyols were detected at -3.6°C, increasing to levels that would confer osmoregulation and cryoprotection. In a second series of experiments, samples of *Umbilicaria antarctica* were acclimated either in darkness or under irradiance and then submitted to a period of freezing followed by an increase in temperature. The carbohydrate status of the tissue prior to treatment proved important in the response to freezing in terms of accumulation or loss. Arabitol and mannitol fluctuated in response to light- or dark-acclimation and to freezing, providing an effective mechanism to adjust the concentration of the soluble carbohydrate and polyol fraction. (Auth. mod.)

B-53273

Nedwell, D.B., Walker, T.R., Ellis-Evans, J.C., **Adaptation and activity of the benthic microbial community in an inshore coastal sediment at Signy Island, South Orkney Islands,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.127-131, 17 refs.

Measurements of oxygen uptake rates by the inshore marine sediments in Factory Cove, Signy I., Jan. 1991-Feb. 1992, showed that there was significant seasonal variation. Benthic O_2 uptake rates diminished during winter when ice cover was present and there was little organic deposition, but increased at the end of winter when melting of sea ice deposited ice algae biomass into the water column. The fresh input of organic matter stimulated benthic respiratory activity, which was subsequently sustained during the spring and summer by the input of further organic detritus from the water column to the sediment. Seasonal changes of benthic activity were therefore related to changes in inputs of organic matter, not to seasonal changes of water temperature which was virtually constant. The rates of benthic O_2 uptake were equal to or greater than rates reported for sediments at much higher ambient temperatures. (Auth.)

B-53274

Pond, D.W., Priddle, J., Sargent, J.R., Watkins, J.L., **Lipid composition of antarctic microplankton in relation to the nutrition of krill,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.133-139, 18 refs.

Microplankton at 5 sites off South Georgia in Jan.-Feb. 1991 was dominated by a range of diatoms. *Phaeocystis* was present in 3 of the 5 sites but in low abundance only. Diatoms dominated at a more southerly site near the Antarctic Peninsula in Mar., whereas dinoflagellates dominated at a site near Deception I. Multivariate analysis allowed the 7 sites to be distinguished on the basis of microplankton species composition. Analysis of 13 lipid classes present in total lipid extracted from the microplankton also demonstrated substantial differences from site to site. Multivariate analysis showed a different pattern of variation from the species ordination, with the South Georgia sites forming a distinct cluster. Outlier sites identified in the species and lipid ordinations confirmed the association between some taxonomic groups and lipid 'fingerprints'. Fatty acids extracted from total lipid in microplankton at the 7 sites ranged from 37-195 µg/1. Polar lipids were rich in (n-3) polyunsaturated fatty acids. (Auth. mod.)

B-53275

Johnston, I.A., **Growth and metabolism in antarctic fish,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.141-150, Refs. p.149-150.

Rates of oxygen uptake were measured in the demersal antarctic species *Notothenia coriiceps* Richardson under fasting conditions, following feeding, and during swimming. The results were compared with measurements on sedentary demersal fish from temperate and tropical environments. Resting and maximum metabolic rates were found to be positively correlated with ambient temperature. Oxygen consumption increased by 2-3 times after a satiating meal in all species. The influence of seasonality on metabolism was investigated in *N. coriiceps* acclimated for 3 months to either simulated winter or summer conditions. Fasting metabolic rates and the characteristics of the SDA were independent of acclimation conditions, which suggests that fish are capable of processing food at similar rates at all times of the year. However, appetite, liver triglyceride stores and activities of some enzymes of intermediary metabolism in the swimming muscles were significantly lower in winter- than summer-acclimated fish. It is suggested that the limited aerobic scope in antarctic fish may necessitate marked seasonal changes in energy allocation, and provide at least part of the explanation for the slow rates of winter growth during periods of relatively constant temperatures and food supply. (Auth. mod.)

B-53277

Goeyens, L., Tréguer, P., Baumann, M.E.M., Baeyens, W., Dehairs, F., **Leading role of ammonium in the nitrogen uptake regime of southern ocean marginal ice zones,** *Journal of marine systems,* June 1995, 6(4), p.345-361, 82 refs.

The nitrogen signature of marginal ice zones in the southern ocean often departs from the "classical" antarctic nutrient profiles with high nitrate and low ammonium values in the surface layer. Weddell Sea marginal ice zones show enhanced nitrate depletions amounting to ≈500 mmol N/m^2. Additionally, ammonium stocks in the upper layer can be up to 7% of the inorganic nitrogen pool. The corresponding nitrogen uptake regime suggests elevated nitrate assimilation during the early phase of the productive season and significantly reduced nitrate assimilation at a later stage. Absolute as well as specific nitrate uptake rates decrease by an order of magnitude when ammonium stocks exceed 1.7% of the total inorganic nitrogen. The variability in nitrogen utilization reflects physiological changes in the phytoplankton assemblage. In response to increased ammonium stocks, phytoplankton show a reduced capacity to take up nitrate and following an initial diatom bloom non-siliceous phytoplankton become predominant in a regenerated production regime. (Auth.)

B-53304

Viñuela, J., Amat, J.A., Ferrer, M., **Nest defence of nesting chinstrap penguins (*Pygoscelis antarctica*) against intruders,** *Ethology,* Apr. 1995, 99(4), p.323-331, 38 refs.

Some predictions of parental investment theory were tested by studying the aggressive behavior of colonial nesting chinstrap penguins against human intruders into their nesting territories. Tests were made for differences in the aggressive behavior of penguins according to offspring age (eggs vs. chicks), offspring number, nest location in the colonies (central vs. peripheral) and sex. Offspring age was the main factor influencing nest defense, although nest location and sex were also important. Chicks were defended more strongly than eggs, in accordance with changes in the reproductive value of offspring, and this increase in aggressiveness was not related to revisitation of the same individuals. The level of aggression of penguins breeding in central sites was higher than that of peripheral birds, a difference that could be due to the lower residual reproductive value of central-nesting, probably older, birds. The stronger aggressiveness of males could be due to a combination of factors related to sexual selection and life-history traits. Offspring number did not affect the level of nest defense. (Auth.)

B-53306

Demer, D.A., Hewitt, R.P., **Bias in acoustic biomass estimates of *Euphausia superba* due to diel vertical migration,** *Deep-sea research, Part I,* Apr. 1995, 42(4), p.455-475, 29 refs.

To demonstrate and quantify negative biases on both the estimates of krill biomass distribution and abundance, a time-depth-density analysis was performed. Data were collected in the vicinity of Elephant I. during the austral summers of 1992 and 1993. Five surveys were conducted in 1992; two covered a 105 by 105 n.mi. area centered on Elephant I., two encompassed a 60 by 35 n.mi. area immediately to the north of the island, and one covered a 1 $n.mi.^2$ area centered on a large krill swarm to the west of Seal I. The 1993 data include repetitions of the two small-area and two large-area surveys. Average krill volume densities were calculated for each hour as well as for three daily periods: day, twilight and night. These data were normalized and presented as a probability of daily average density. Details of the calculations showing how the raw data were reduced are provided. The effect of DVM on the estimates of krill distribution is illustrated by a comparison of compensated and uncompensated density maps of two 1992 surveys. Through this technique, high density krill areas are revealed where uncompensated maps indicated low densities. (Auth. mod.)

B-53323

Cherel, Y., Freby, F., **Daily body-mass loss and nitrogen excretion during molting fast of macaroni penguins,** *Auk,* Apr. 1994, 111(2), p.492-495, 18 refs.

Six penguins were captured and held for about 32 days at Possession I. During this molting/fasting period, guano was collected daily and analyzed; at the end of the period body mass had decreased by about 55%. Details of the three phases of changes in the birds' body chemistry and physiology during the molt/fast season are given.

B-53324

Yorio, P., Boersma, P.D., **Consequences of nest desertion and inattendance for Magellanic penguin hatching success,** *Auk,* Jan. 1994, 111(1), p.215-218, 22 refs.

Advantages of shared parental care during incubation are that eggs are attended at all times, protected against predators, and incubated at the correct temperature. However, egg neglect and desertion by parents are frequent in many bird species. Nest desertion increases egg losses for several seabird species, and has been suggested as the main cause of decreased hatching success in the Magellanic penguin. In Magellanic penguins, eggs abandoned by an incubating bird may be left unattended for several days until the mate returns to resume incubation. It is concluded that predation is more likely on deserted or neglected nests and that a major cause of this condition is a nearby human presence which tends to frighten the breeding birds into abandoning the nests.

B-53325

Smith, H.G., Crook, M.J., **Temperature relations of soil protists in the antarctic zone as an indicator of climate change,** *Acta zoologica Fennica,* Feb. 28, 1995, No.196, p.183-185, 23 refs.

The temperature adaptations of three heterotrophic soil protists have been investigated in relation to the microclimate of maritime antarctic fell-fields: the microflagellate *Heteromita globosa* Stein and the ciliates *Colpoda cucullus* Muller and *Leptopharynx* sp. (Levander) Mermod, by population growth rate determinations and cold-stage microscopy. Results suggest that *Heteromita* and *Colpoda* avoid nocturnal freezing by cold-induced encystment at low super-zero temperatures, whereas *Leptopharynx* appears to be cryo-tolerant without encystment. Monitored microclimates in the maritime antarctic do not provide enough degree-hours per day for the growth of *Colpoda* spp.; subantarctic microclimates are more favorable, as may be exceptional locations in continental Antarctica where there is continuous insolation in summer. It is suggested that the occurrence of common species of soil protists near their altitudinal or latitudinal limits of distribution may serve as sensitive indicators of the biological effects of climatic change. (Auth. mod.)

B-53326

Wang, X., DeVries, A.L., Cheng, C.H.C., **Genomic basis for antifreeze peptide heterogeneity and abundance in an antarctic eel pout: gene structures and organization,** *Molecular marine biology and biotechnology,* June 1995, 4(2), p.135-147, Refs. p.146-147.

Type III antifreeze protein (AFP) in the antarctic eel pout occurs as a heterogeneous family of 3 major and at least 5 minor variants collectively maintained at high year-round blood levels (>20 mg/ml). Two major AFPs (RD1, RD2) are 7 kD in size, and the third (RD3) is 14 kD and is composed of two 7-kD AFP domains linked by a 9-residue connector. The genomic basis for the heterogeneity and abundance of these AFPs was investigated in this study. Genomic library screening statistics and restriction mapping analyses of 16 genomic clones together indicate an AFP gene family of over 40 genes, which would provide a sizable gene dosage for high AFP output. Two genomic clones, each containing 2 AFP genes, were characterized in detail. Three of the genes encode the 7-kD AFP RD2, and are arrayed in direct 8.3-kb tandem repeats. The three gene sequences are nearly 100% identical for a distance of over 3 kb indicating strong selective pressure from the freezing antarctic waters on maintaining functionality of AFP genes for producing adequate levels of AFPs for survival. The fourth AFP gene has multiple exons and translates into a multimeric AFP composed of at least six 7-kD AFP domains. (Auth. mod.)

B-53327

Wöhrmann, A.P.A., **Antifreeze glycopeptides of the high-Antarctic silverfish *Pleuragramma antarcticum* (Notothenioidei),** *Comparative biochemistry and physiology,* May 1995, 111C(1), p.121-129, Refs. p.128-129.

Antifreeze glycopeptides (AFGP) have been isolated from the fully pelagic high-antarctic silverfish *Pleuragramma antarcticum* of the suborder Notothenioidei (Perciformes). The fishes were caught during the PRV *Polarstern* expedition EPOS III (Jan.-Mar. 1989) in the eastern and south-eastern Weddell Sea. Glycoconjugate and amino acid analysis of AFGP indicate that the glycopeptide structure is identical to the polymers of previously studied antarctic notothenioids. The content of AFGPs in *P. antarcticum* is lower than in other notothenioid fish from the same region. Antifreeze activity shows a maximal hysteresis of 1.19°C at a concentration of 20 mg/ml AFGP. A linear increase in activity of the antifreeze glycopeptides could be demonstrated concomitant with a decreasing ice content. The freezing point of blood serum is -1.9°C. (Auth.)

B-53328

Kennedy, A.D., **Temperature effects of passive greenhouse apparatus in high-latitude climate change experiments,** *Functional ecology,* Apr. 1995, 9(2), p.340-350, Refs. p.349-350.

Passive greenhouse apparatus is commonly used to investigate the *in situ* biological response of terrestrial communities to global warming. Here, the relationship between passive greenhouse thermal environment and future climate conditions is considered using temperature data collected from within and without greenhouses deployed in the maritime antarctic. It is revealed that in terms of thermal extremes, diel and annual variation, and overall distribution across the temperature spectrum, such apparatus achieves only poor simulation of GCM (general circulation model) forecasts. During summer, greenhouses induce an amplified daily range of temperatures, elevated maxima and accelerated rates of change. During spring and autumn, diel temperature variation continues inside the greenhouses while snow cover protects the controls. During winter, an inverse treatment effect occurs, in which the relative depth of snow cover causes lower temperatures in greenhouses than in controls. These treatment effects differ significantly from GCM climate predictions. (Auth. mod.)

B-53329

Miller, W.R., Heatwole, H., **Tardigrades of the Australian Antarctic Territories: the Mawson Coast, East Antarctica,** *Invertebrate biology,* 1995, 114(1), p.27-38, Refs. p.37-38.

A survey of the terrestrial tardigrades inhabiting soil, algae, lichens, and mosses was conducted during the austral summer of 1990 at Mawson Station and other localities on the Mawson Coast. Five genera and six species of tardigrades were recovered: *Echiniscus jenningsi, Diphascon sanae, Hypsibius antarcticus, Macrobiotus blocki, Macrobiotus stuckenbergi,* and *Milnesium tardigradum.* Males have seldom been reported in the genus *Echiniscus,* but constituted about 40% of the population of *E. jenningsi.* Such a high concentration of males suggests a sexually reproducing population of *E. jenningsi* on the Mawson Coast. Patterns, obstacles, and strategies of dispersal, reproduction, and survival are discussed relative to the harsh insular environment of East Antarctica. (Auth.)

B-53345

Green, K., et al, **Difficulties in assessing population status of ice seals,** *Wildlife research,* 1995, 22(2), p.193-199, 12 refs.

The best method of monitoring ice seal populations in shifting pack ice is by aerial census. However, there are a number of problems with this method that are difficult to address in the pack ice, being best addressed on more accessible ice seals such as the Weddell seal. Counts made during the moult are affected by the fact that Weddell seals can leave the fast ice to forage. Seal numbers on the fast ice will therefore differ depending upon the proximity and availability of prey species, with lower numbers being recorded on the fast ice the further the seal has to travel from the ice to find food. In any census the subgroup of the population that is being counted must be known. Southern elephant seals and Weddell seals haul out to moult in sequences on the basis of age, sex and reproductive condition. This leads to periods of high and low counts through the moult. Examination of data on crabeater seals indicates that a putative 60% decline in numbers may have been due to counts being made at different times of the moult and therefore with different subgroups of the population being counted. (Auth.)

B-53348

Kopczyńska, E.E., **Net phytoplankton annual cycle (February 1990-January 1991) in Admiralty Bay, King George Island,**

Antarctica, *Polish polar research,* 1993, 14(4), p.383-392, With Polish summary. 26 refs.

Net phytoplankton cell numbers in 50 m water column of Admiralty Bay, King George I. ranged between 0.2 x $10^5/m^2$ on Aug. 24, 1990 and 2.3 x $10^7/m^2$ on Nov. 15, 1990. Cluster analysis has confirmed the presence of two groups of samples: spring and summer ones (Oct. to Apr.), rich in cells and in species, and winter samples (June to Aug.) impoverished in algae. The abundance and succession of species in Admiralty Bay reflect seasonal differences in diatom growth; they also reflect mixed populations of the Weddell and Bellingshausen seas entering Admiralty Bay via Bransfield Strait. The striking scarcity of algae in some summer samples can most likely be attributed to zooplankton grazing. (Auth. mod.)

B-53349

Luścińska, M., Kyć, A., **Algae inhabiting creeks of the region of "H. Arctowski" Polish antarctic station, King George Island, South Shetlands,** *Polish polar research,* 1993, 14(4), p.393-405, With Polish summary. 10 refs.

In material collected at 26 stations along the course of three creeks in the vicinity of Arctowski Station, 183 taxa of algae have been identified: 25 of Cyanophyta, 123 of Bacillariophyceae, 2 of Xanthophyceae, 2 of Chrysophyceae and 31 of Chlorophyta. The highest species diversity was found in the algal community in Creek II (132 taxa), followed by the "Petrified Forest Creek" (97 taxa), and the least diversified algal community was that from the "Ornithologists' Creek" (73 taxa). (Auth. mod.)

B-53350

Sosiński, J., Paciorkowski, A., **State of mackerel icefish (*Champsocephalus gunnari* Lonnberg, 1905) stock from South Georgia area based on Polish investigations in 1975-1992,** *Polish polar research,* 1993, 14(4), p.407-431, With Polish summary. 23 refs.

Results of Polish biological investigations and surveys on the state of mackerel icefish (*Champsocephalus gunnari* Lonnberg, 1905) stock served to simulate an independent estimation of some of its biological parameters as well as at the assessment of its biomass and fishing mortality during 1975-76 and 1991-92 fishing seasons with the virtual population analysis (VPA) method. Based on data from available literature, the coefficient of natural mortality (M) was assumed to be 0.5. VPA results indicate that the total stock biomass during the 1991-92 season amounted to 34,818 tonnes and was approximately 10 times lower than in the 1975-76 season. Spawning stock biomass declined to a minimum of 7,396 tonnes in 1989-90. The assessment results point to recruitment as a major factor contributing to the stock fluctuations. (Auth. mod.)

B-53351

Coria, N.R., Montalti, D., **Flying birds at Esperanza Bay, Antarctica,** *Polish polar research,* 1993, 14(4), p.433-439, With Polish summary. 14 refs.

Flying bird counts were carried out at Esperanza Bay, Antarctic Peninsula, between Nov. 1989 and Feb. 1990. Six breeding species and six visitor species were recorded. Kelp gull and antarctic tern populations have decreased in relation to the data by previous authors, perhaps as a result of the increased activity at Esperanza Station. (Auth. mod.)

B-53352

Rakusa-Suszczewski, S., Sierakowski, K., **Pinnipeds in Admiralty Bay, King George Island, South Shetlands (1988-1992),** *Polish polar research,* 1993, 14(4), p.441-453, With Polish summary. 17 refs.

Pinnipeds were monitored in Admiralty Bay, King George I. between 1988 and 1992. No particular trends during this period were found, but seasonal changes in each are distinct. It is suggested that the phenology of pinnipeds and that of penguins ensures low competition for food between these groups. (Auth. mod.)

B-53359

Ito, N., Komiyama, N.H., Fermi, G., **Structure of deoxyhaemoglobin of the antarctic fish *Pagothenia bernacchii* with an analysis of the structural basis of the Root effect by comparison of the liganded and unliganded haemoglobin structures,** *Journal of molecular biology,* July 28, 1995, 250(5), p.648-658, 23 refs.

The authors have determined the structure of deoxyhaemoglobin from the antarctic fish *Pagothenia bernacchii* at pH 6.2 to a resolution of 2.2 Å with X-ray data from a twinned crystal deconvoluted so as to approximate data from a single crystal. The R-factor between the (twinned) model and the observed data is 16% for reflections used in refinement and 22% for reflections not used in refinement. The T (deoxy) structure was compared with the R (liganded) structure at pH 8.0 in an attempt to understand the structural basis of the greater affinity for hydrogen ions of T, relative to R, that comprises the Root effect. Up to half of the effect can be attributed to interaction of the residues Asp95 (G1)α and Asp101 (G3)β: in R the residues are far apart and their carboxyl groups are unprotonated, but the shift at the $\alpha_1\beta_2$ interface that accompanies the R to T transition brings them so close that they appear to share a proton between them. The proximity of Asp99 (G1)β may contribute to the required raising of the pK_a values of the other two Asp residues. (Auth. mod.)

B-53360

Wiencke, C., Clayton, M.N., Schulz, D., **Life history, reproductive morphology and development of the antarctic brown alga *Desmarestia menziesii* J. Agardh,** *Botanica acta,* June 1995, 108(3), p.201-208, Refs. p.207-208.

The life history, reproduction and development of *Desmarestia menziesii* J. Agardh from Antarctica is described. Unilocular sporangia occur singly or in small groups in the outermost cortical layer of the sporophyte. They are formed by periclinal division of cortex cells into a stalk cell and the sporangium initial. Meiospores germinate into dioecious microscopic filamentous gametophytes. As in other perennial antarctic species of the Desmarestiales, gametangia are formed in culture under short-day conditions or in darkness. In nature, juvenile sporophytes should therefore be formed in winter. They develop only attached to the oogonium. At first they are uniseriate and elongate by means of an intercalary meristem located in their middle part. Laterals are formed predominantly in this region, and they subsequently give rise to secondary laterals. The branching pattern is opposite to alternate in both young and adult plants. The observations are discussed in relation to possible evolutionary relationships in the genus *Desmarestia* and in the order Desmarestiales. (Auth. mod.)

B-53372

Amundsen, T., **Egg size and early nestling growth in the Snow Petrel,** *Condor,* May 1995, 97(2), p.345-351, 39 refs.

This study considers egg size variation and the influence of egg size on early nestling growth, in Snow petrels breeding at Svarthamaren, Queen Maud Land. Egg sizes ranged from 36.4 to 52.1 cm^3, with a mean of 44.9 cm^3. Hatching occurred during Jan. 16-24, with a median hatching date of Jan. 20. Egg size had a significant effect on the body mass of hatchlings, explaining 30% of the variation in body mass of nestlings hatched within the last 24 hr, and 58% of the body mass variation of nestlings weighed while still slightly wet. An experiment, which included swapping of eggs between nests, together with analyses of non-manipulated nests revealed an effect of egg size on nestling body masses at ages of two and four days. From the experiment, no effect of maternal quality as expressed by her egg size could be found. At an age of four days, 40% of the nestlings were left alone in the nest by their parents. Nestlings not attended by a parent at this age were significantly lighter than were those with parental company. Parents that had left their young by the time these were four days old may have been poor quality birds, as indicated by the tendency for such birds to have laid smaller eggs than had those still tending their young at the same nestling age. (Auth. mod.)

B-53392

Gómez, I., Wiencke, C., Weykam, G., **Seasonal photosynthetic characteristics of *Ascoseira mirabilis* (Ascoseirales, Phaeophyceae) from King George Island, Antarctica,** *Marine biology,* July 1995, 123(1), p.167-172, 35 refs.

The aim of this work was to examine the life-strategy of *Ascoseira mirabilis* on King George I. in terms of seasonal variation in physiological parameters. Photosynthesis, dark respiration, Chl *a* content and carbon:nitrogen ratios were measured in different thallus sections of adult plants collected directly from the field during the main growth period of the alga, i.e., between Sep. and Feb. (Auth. mod.)

B-53409

Jochem, F.J., Mathot, S., Quéguiner, B., **Size-fractionated primary production in the open southern ocean in austral spring,** *Polar biology,* July 1995, 15(6), p.381-392, Refs. p.391-392.

Size-fractionated primary production was measured by carbon-14 uptake incubations on 3 transects between 47°S and 59°30'S along 6°W in Oct./Nov. 1992. Open Antarctic Circumpolar Current and ice-covered Weddell Gyre water showed comparable low productivity and size distribution. Picoplankton (<2 μm) was the dominant size fraction, contributing approximately half to the total water column production. Productivity in the Polar Front Zone north of 50°S, with higher water column stability, was up to 10 times higher with microplankton (>20 μm) being predominant. No ice-edge bloom occurred over the 2 month study period; this is explained by non-favorable hydrographic conditions for blooming and the lack of meltwater lenses upon ice retreat. Mixing, together with light climate, are discussed as the driving forces for antarctic primary production and for its size structure. (Auth. mod.)

B-53410

Fabiano, M., Danovaro, R., Crisafi, E., La Ferla, R., Povero, P., Acosta Pomar, L., **Particulate matter composition and bacterial distribution in Terra Nova Bay (Antarctica) during summer 1989-1990,** *Polar biology,* July 1995, 15(6), p.393-400, Refs. p.399-400.

The elemental (organic carbon and nitrogen) and biochemical composition of organic matter in Terra Nova Bay was related to bacterioplankton abundance and pico-phytoplankton density. The ATP concentrations were also measured. Total seston was characterized by little spatial variation and was unrelated to the distance from the coast. Suspended particulate matter included some terrestrial components but was mostly composed of autochthonous material. Particulate organic matter was characterized by a uniform distribution and homogeneous composition (mostly of phytoplanktonic origin), and was associated with a relatively scarce microbial community characterized at the surface by high picophytoplankton density. The increase with depth of the living carbon fraction suggested an increase in the microheterotrophic community in the deeper water layers. (Auth. mod.)

B-53411

Vinocur, A., Pizarro, H., **Periphyton flora of some lotic and lentic environments of Hope Bay (Antarctic Peninsula),** *Polar biology,* July 1995, 15(6), p.401-414, Refs. p.413-414.

A taxonomic study was made of the periphytic algal flora of some freshwater environments at Hope Bay during summer 1992-93. Seven lakes and two pools that are characterized by different trophic levels were studied. The largest, Boeckella Lake, has an important outflow (Praisola Stream) that was also analyzed. Ninety-seven algal taxa, including specific and infraspecific entities, are recorded. Thirty-one new records for the antarctic continent are described and illustrated. The flora comprises 44.4% Cyanophyceae, 21.6% bacillariophyceae, 18.5% Chlorophyceae, 9.3% Tribophyceae, 4.2% Chrysophyceae and 2% Zygophyceae. The epilithic flora of Hope Bay shows a high species richness. *Phormidium fragile* and *Lyngbya lagerheimii* were the most abundant species among the Cyanophyceae. In the algal mats the authors also found Chrysophyceae (mainly *Hydrurus foetidus* and *Chrysococcus rufescens)* and the macroscopic chlorophycean *Prasiola crispa. Tribonema australis* sp. nov. (Tribonematales, Tribophyceae) is put forward as a new species. *Hormidium fluitans* (Gay) Heering is renamed *Klebshormidium fluitans.*

B-53412

Coria, N.R., Spairani, H., Vivequin, S., Fontana, R., **Diet of Adélie penguins *Pygoscelis adeliae* during the post-hatching period at Esperanza Bay, Antarctica, 1987/88,** *Polar biology,* July 1995, 15(6), p.415-418, 25 refs.

The diet of the Adélie penguin was studied in Hope Bay during the post-hatching period by quantitative analysis of adult stomach contents. Euphausiids constituted on average 96% by mass, while fish contributed 4% by mass. Amphipods were present in small amounts. Krill *Euphausia superba* was the predominant component throughout the sampling period. In contrast, *Euphausia crystallorophias* occurred rarely. Differences in the size of krill taken by Adélie penguins appear to reflect either local changes in the availability of certain age classes at various times in the breeding season, or differences in foraging areas, or are due to year-to-year differences in prey availability and abundance, possibly caused by variations in seasonal ice cover. *Pleuragramma antarcticum* constituted the bulk of the fish portion, particularly during the guard period. (Auth.)

B-53413

Richardson, A.M.M., Jackson, J.E., **First record of a terrestrial landhopper (Crustacea: Amphipoda: Talitridae) from Macquarie Island,** *Polar biology,* July 1995, 15(6), p.419-422, 23 refs.

A terrestrial talitrid crustacean is recorded for the first time from subantarctic Macquarie I. The species, *Puhurunuru patersoni,* is native to the southern part of the South I. of New Zealand. Its distribution on Macquarie I. is restricted to a single locality near the ANARE station on the Isthmus. All mature females collected in Dec. were carrying eggs; females appeared to be less mobile than males. It seems likely that the species was transported accidentally from New Zealand, perhaps by the same means that introduced the isopod *Styloniscus otakensis,* also from southern New Zealand. (Auth.)

B-53414

Perriss, S.J., Laybourn-Parry, J., Marchant, H.J., **Widespread occurrence of populations of the unique autotrophic ciliate *Mesodinium rubrum* (Ciliophora: Haptorida) in brackish and saline lakes of the Vestfold Hills (eastern Antarctica),** *Polar biology,* July 1995, 15(6), p.423-428, Refs. p.427-428.

The occurrence of the unique autotrophic ciliate *Mesodinium rubrum* was investigated in a suite of lakes of various salinities situated in the Vestfold Hills. *M. rubrum* was found to occur in all but the most hypersaline lakes in the survey but was most numerous in the more brackish lakes. Salinity and water column temperature appeared to be the most important factors controlling the occurrence and abundance of this species. Nutrient levels (phosphate and nitrate) did not appear to be important controlling factors, although their influence may have been distorted by the fact that nutrient concentrations were generally higher in the more saline lakes. The widespread occurrence of this species in brackish and saline lakes of the Vestfold Hills provides opportunities to study the ecology and possible physiological and ultrastructural adaptations to living in a high-latitude environment of this ubiquitous and important species in marine microbial food webs. (Auth.)

B-53415

Tagliafierro, G., Faraldi, G., Delù, M., Morescalchi, M.A., **Gut regulatory peptides in some antarctic notothenioids,** *Polar biology,* July 1995, 15(6), p.429-435, Refs. p.434-435.

The presence and the comparative distribution of regulatory peptides and serotonin in the gut of four species of notothenioid fishes *[Cryodraco antarcticus* and *Chionodraco hamatus* (Channichthyidae), and *Trematomus bernacchii* and *Trematomus newnesi* (Nototheniidae)], were immunohistochemically studied. Numerous immunoreactive (IR) endocrine cells and nerve elements were detected. In the nototheniids most of the IR nerve fibers were of the intrinsic type, while most of the IR nerve fibers of the channichthyid intestine, besides insulin-like IR fibers, seemed to be of the extrinsic type. The intensity and frequency of immunopositivity are not the same in channichthyids and nototheniids; the species belonging to the first family show many differences from the teleosts living in temperate water. The finding of insulin-like endocrine cells and nerve fibers in the gut wall of *C. antarcticus* is exceptional for vertebrates and merits special attention. (Auth.)

B-53416

Mikaelian, A.S., Beliaeva, G.A., **Chlorophyll "a" content in cells of antarctic phytoplankton,** *Polar biology,* July 1995, 15(6), p.437-445, Refs. p.444-445.

From material collected in the Weddell Sea and the Bransfield Strait in Jan./Apr. 1989, data on size-taxonomic composition and biomass of phytoplankton communities and Chl concentration were obtained to estimate the chlorophyll *a* (Chl) cell content. Single cell fluorescence measured microscopically was used as a relative index of cellular Chl content of individual species. The relationship between the species composition of the algal communities and the ratio of phytoplankton carbon:Chl concentration (C:Chl) was found. Due to changes in species composition the average C:Chl ratio in Mar./Apr. was half that in Jan./Feb. The C:Chl ratio ranged from 24 to 215 (mean=101) in the upper mixed layer and from 14 to 69 (mean=37) in the pycnocline region. The distribution of cellular Chl within individual species showed lower heterogeneity in the mixed layer in comparison with that in the pycnocline and below. Below the mixed layer, population consisted partly of dead cells with very low pigment content, while other cells had greatly increased cellular Chl. (Auth. mod.)

B-53417

Mund, M.J., Miller, G.D., **Diet of the south polar skua *Catharacta maccormicki* at Cape Bird, Ross Island, Antarctica,** *Polar biology,* July 1995, 15(6), p.453-455, 14 refs.

Regurgitated pellets and fecal samples from south polar skuas *Catharacta maccormicki* breeding on Ross I. were analyzed for diet items. Adult penguin feathers were found in 79% of all the pellets and 42% of the fecal samples. Evidence of fish was found in 26% of the pellets and 39% of the fecal samples. The amount of refuse in the diet of skuas on Ross I. was directly related to the distance from McMurdo Station. (Auth.)

B-53418

Samyshev, E.Z., **Antarctic krill and the structure of plankton community in its areal** [Antarkticheskii kril' i struktura planktonnogo soobshchestva v ego areale], Moscow, Nauka, 1991, 166p., In Russian with English summary. Refs. p.152-166.

DLC QL444.M338S36

On the basis of long-term field and experimental observations in selected regions of typical krill habitat, the most significant structural and functional characteristics of krill and the main components of the plankton community in its areal are discussed in this book.

B-53447

Petz, W., **Morphology and morphogenesis of *Thigmokeronopsis antarctica* nov. spec. and *T. crystallis* nov. spec. (Ciliophora, Hypotrichida) from antarctic sea ice,** *European journal of protistology,* May 26, 1995, 31(2), p.137-147, 24 refs.

The morphology and morphogenesis of *Thigmokeronopsis antarctica* n.sp. and *T. crystallis* n.sp., discovered in brine channels of antarctic sea ice, were investigated using protargol silver impregnation. Both species are characterized by a left postural ciliary field which is composed of many fewer longitudinal files than in *T. jahodai,* the type species of the genus. In addition, the new species have unique morphogenetic features, viz. all marginal and dorsal primordia originate de novo and the macronuclear nodules fuse incompletely during cell division. *T. antarctica* is distinguished from *T. jahadai* by shortened midventral rows, 1 left postoral file and 3-4 buccal cirri. *T. crystallis* has long midventral rows, usually 5 slightly irregular left postoral files, 1 buccal, and 8 transverse cirri. Morphogenesis is similar in both species, i.e. an anarchic field originates close to left midventral cirri and produces the opisthe's adoral membranelles, undulating membranes, and fronto-ventral-transverse (FVT) cirri; the proter's anarchic field forms near the paroral membrane and splits into primordia for undulating membranes and adoral membranelles; the FVT anlage originates independently close to the anterior left midventral cirri; all primordia form apparently de novo and all parental cirri are replaced. Reorganization resembles the development of the proter. (Auth.)

B-53448

Thomsen, H.A., Kosman, C., Ikävalko, J., **Three new species of *Thaumatomastix* (Thaumatomastigidae, Protista incertae sedis), a ubiquitous genus from the antarctic ice biota,** *European journal of protistology,* May 26, 1995, 31(2), p.174-181, 16 refs.

Recent opportunities to sample live material from antarctic ice biota have resulted in the discovery of numerous autotrophic and heterotrophic flagellate components of this community. In certain samples, some of these hitherto neglected types of organisms are obviously key components of the ice biota. One such example is found in species of the heterotrophic flagellate genus *Thaumatomastix* (Thaumatomastigidae, Protista incertae sedis). Three new species are described *(T. splendida* sp. nov., *T. fragilis* sp. nov., and *T. fusiformis* sp. nov.) one of which *(T. splendida)* has been found to be ubiquitous in antarctic sea ice and also most likely a significant member of the arctic sea ice community. (Auth.)

B-53449

Boyd, I.L., Croxall, J.P., Lunn, N.J., Reid, K., **Population demography of antarctic fur seals: the cost of reproduction and implications for life-histories,** *Journal of animal ecology,* July 1995, 64(4), p.505-518, Refs. p.517-518.

This study examined the costs of reproduction in terms of future survival and reproduction in female antarctic fur seals from Bird I. It used mark-recapture data from 11 consecutive years, including 3 years when several indices showed that food availability was well below average. Population age structures were used, in conjunction with the measured age-specific survival rates, to estimate the rate of increase of the population as 10.7% per annum. There was no evidence of senescence. Survival rate was not related to year of birth or age, after accounting for variation due to pregnancy and calendar year. Mean pregnancy rate was 0.70 with an inter-annual range of 0.59-0.88. Although females normally produced their first pups at age 3-4 years, pregnancy rate peaked at age 8 years and declined thereafter. Reproduction incurs costs to females, in terms of reduced survival and future fecundity, and consequently, on average, females which survive longest tend to do so because they have lower fecundity. (Auth. mod.)

B-53450

Arnould, J.P.Y., Boyd, I.L., Clarke, A., **Simplified method for determining the gross chemical composition of pinniped milk samples,** *Canadian journal of zoology,* Feb. 1995, 73(2), p.404-410, With French summary. Refs. p.409-410.

A simplified method for determining milk composition in pinnipeds was assessed using samples collected from antarctic fur seals *(Arctocephalus gazella).* The stoichiometric relationships between elemental C, H, and N in the ash-free dry mass were used to determine the organic composition and energy content of samples. The results were compared with those obtained by conventional biochemical analyses. Stoichiometric estimates of lipid content were positively correlated with those obtained by methanol-chloroform extraction but consistently lower. The mean difference between the results of the two methods was 3.56±0.89% of total milk volume. Variation between replicates was significantly lower when the stoichiometric method was used. This method for determining organic composition allows the processing of samples at a much faster rate, requiring much smaller volumes than conventional techniques and should prove useful in ecological studies of lactation. (Auth. mod.)

B-53451

Coombs, S., Montgomery, J., **Structual diversity in the lateral line system of antarctic fish: adaptive or non-adaptive?,** *Sensory systems,* Dec. 1994 (Pub. Oct. 1995), 8(3-4), p.150-156, Translated from Sensornye sistemy. 47 refs.

It is proposed that the argument that much of the variation seen in lateral line structures of antarctic notothenioid fish may have evolved not in response to selective pressures for lateral line function, but to pressures for increased buoyancy, which does not exclude the possibility that some of this variability may be adaptive. It is suggested that the failure of canals to become completely enclosed in bone in channichthyid fishes occurred because of a paedomorphic process driven by selective pressures for increased buoyancy. Additional peramorphic processes resulted in the ballooning out of tubules and canal walls in response to selective pressures for lateral line function, perhaps increasing sensitivity in a narrow frequency range. (Auth. mod.)

B-53460

Evseenko, S.A., Kock, K.H., Nevinskiĭ, M.M., **Early life history of the Patagonian toothfish, *Dissostichus eleginoides* Smitt, 1898 in the Atlantic sector of the southern ocean,** *Antarctic science,* Sep. 1995, 7(3), p.221-226, 25 refs.

Dissostichus eleginoides spawn over the continental slope from June to Sep. The eggs, 4.3-4.7 mm diameter, are found in the upper 500 m of the water column over waters 2200-4400 m deep. Incubation of eggs is likely to take about three months. Hatching is probably in Oct./Nov. Embryos in egg development stages III and IV are described. Scales are not present until the fish are about 64-74 mm long. (Auth.)

B-53461

Gutt, J., Koltun, V.M., **Sponges of the Lazarev and Weddell Sea,**

Antarctica: explanations for their patchy occurrence, *Antarctic science,* Sep. 1995, 7(3), p.227-234, Refs. p.233-234.

Seventy-three sponge species were caught at 23 stations on the continental shelf of the Lazarev and Weddell Seas. *Tedania tantula* was the most often found amongst the 63 demosponge species caught, and among the 5 hexactinellid species. *Rossella racovitzae* was most common. The stations were classified according to their species inventory, and so the individual stations of the resulting 4 groups were rather uniformly dispersed over the entire investigation area. The species composition of adjacent stations varied considerably. There was no discernible relationship between the biological set of data and any combination of the available environmental characteristics of the stations. The sponge fauna of the Lazarev Sea did not differ appreciably from that of the adjacent Weddell Sea. The only species to be recorded for the first time on the antarctic continental shelf were *Homaxinella flagelliformis* and *Hyrtios arenosa.* Small-scale environmental events such as iceberg scouring, or biological characteristics such as extremely slow growth and budding reproduction, are thought to generate the patchy distribution pattern. (Auth.)

B-53462

Reid, K., **Diet of antarctic fur seals *(Arctocephalus gazella* Peters 1875) during winter at South Georgia,** *Antarctic science,* Sep. 1995, 7(3), p.241-249, Refs. p.248-249.

The diet of mainly adult and sub-adult male antarctic fur seals was investigated during the austral winters of 1992 and 1993 using faecal (scat) analysis. Of samples containing identifiable prey remains (n=376), c. 28% contained krill alone, c. 37% contained fish alone and c. 35% contained both krill and fish. The mean size of krill taken was smaller than in summer due to the absence of large adult krill. Of the 25 fish taxa taken, krill-feeding species predominated, especially in scats that also contained krill. Non-krill feeding species were more abundant in scats containing fish alone. The mackerel icefish *(Champsocephalus gunnari* Lönnberg 1905), which feeds mainly on krill, was the most important fish species in terms of absolute frequency (53%), frequency of occurrence (69%) and estimated biomass (47%); fur seals may have a significant impact on local stocks of this species. Cephalopods and pelagic fish (myctophids) were of minor importance in the diet (<2%). The importance of krill and krill-feeding fish species suggests that the male fur seals are targeting their foraging on a krill and fish community, probably associated with krill aggregations. (Auth.)

B-53463

Schroeter, B., Olech, M., Kappen, L., Heitland, W., **Ecophysiological investigations of *Usnea antarctica* in the maritime Antarctic. 1. Annual microclimatic conditions and potential primary production,** *Antarctic science,* Sep. 1995, 7(3), p.251-260, Refs. p.259-260.

Photosynthetic photon flux density (PPFD), air relative humidity and thallus temperature (TT) were measured in *Usnea antarctica* over a period of 12 months at a coastal rock on King George I. Daily maximum TT exceeded 0°C every month except in June and July when they were below -0.4°C and -1.6°C, respectively. Daily minimum temperatures were always below zero. Diel courses of PPFD showed pronounced seasonal differences between summer and winter. The daily sum of PPFD was highest in Dec. and lowest in July. The potential carbon balance indicates that primary production is severely limited by low PPFD and subzero TT in the austral winter. Nevertheless, the PPFD and TT would allow metabolic activity during winter but with a negative carbon balance during May-Aug. Spring and autumnal months are revealed as probably the most important periods for lichen primary production because PPFD exceeds photosynthetic light compensation point during the daytime and ambient moisture conditions frequently favor a positive carbon balance. (Auth. mod.)

B-53464

Thor, G., **Reassessment of the first lichen and moss collections from Heimefrontfjella, Dronning Maud Land,** *Antarctic science,* Sep. 1995, 7(3), p.261-264, 12 refs.

The lichen and moss collections by G.T. Bowra in Heimefrontfjella in 1963-64 are redetermined. These are the only plant collections made in Heimefrontfjella prior to a Swedish expedition in 1991-92. Taxonomical and nomenclatural improvements have resulted in several changes. A total of 16 lichens and two mosses were found. (Auth.)

B-53514

Emslie, S.D., Karnovsky, N.J., Trivelpiece, W., **Avian predation at penguin colonies on King George Island, Antarctica,** *Wilson bulletin,* June 1995, 107(2), p.317-327, 15 refs.

Predation at seven colonies of breeding pairs of Adélie and Gentoo penguins was observed from Dec. 21, 1993 to Feb. 3, 1994. Observations at the colonies continued for 96 h to record foraging by Brown skuas, Kelp gulls, and Giant petrels during the early chick through creche phase of the penguin breeding cycle. Activity rates by predators varied little with time of day or time of season for skuas and petrels. Kelp gulls, however, showed significant variation in rates with time of season. Total activity and search rates were significantly higher for each predator species at larger versus smaller colonies. In addition, attempted predation and predation by skuas on penguin chicks were significantly higher and more frequent at colony edges than at the center. Larger colonies probably receive greater attention by predators because of the large number of prey, and by their greater circumference and edge area. Low breeding success by penguins in small colonies appeared to be partially attributed to predation losses, although predation rates were low. Penguin reproductive success may be significantly influenced by colony size and by the number and kinds of predators attending them. (Auth.)

B-53518

Anderson, M.E., **Systematics and osteology of the Zoarcidae (Teleostei: Perciformes),** *Ichthyological bulletin,* May 1994, No.60, 120p. + appends. 1 and 2, Refs. p.101-111.

DLC QL614.I28

The eelpouts, Zoarcidae, are a group of perciform fishes, most species of which inhabit continental shelves and slopes of boreal seas. There are about 220 valid species; most are rare, deep-sea forms and the systematics and biology of the group have been neglected by most workers. This work is a contribution to the improvement of that state. The anatomy of the Zoarcidae was studied to reconstruct phylogeny and establish generic limits. From an analysis of a matrix of 76 characters, the 45 genera recognized here form 4 subfamilies. The more primitive zoarcids have 4-6 suborbital bones arranged in a circular pattern close to the orbit, and "complete" cephalic lateralis pore patterns, except some of the few deep-sea forms. The more derived zoarcids have 6-11 suborbital bones arranged in an angled, or "L"-shaped pattern away from the orbit and have no interorbital pores. Zoarcids are considered to have originated in the North Pacific Ocean, perhaps as early as the Eocene, when a pre-percoid radiation occurred. The suborder Zoarcoidei spread across the Pacific rim. Among Zoarcidae, a pre-Miocene radiation took place along the western coasts of the Americas, with areas of endemism forming in the Magellan Province of South America and Antarctica. About fifteen of the species described here have been identified in the antarctic and subantarctic regions. (Auth. mod.)

B-53519

Goldsworthy, S.D., **Differential expenditure of maternal resources in antarctic fur seals, *Arctocephalus gazella,* at Heard Island, southern Indian Ocean,** *Behavioral ecology,* Summer 1995, 6(2), p.218-228, 46 refs.

In a study on lactating fur seals, the mean birth mass, growth rate, and mass at 60 days of sons were significantly greater than those of daughters. Maternal foraging trips lasted on average 5.9 days, and attendance bouts lasted 1.5 days. Over the course of this study, foraging trip duration increased from 5.0 to 7.0 days, and attendance duration declined from 2.0 to 1.5 days. Pups lost 3.2% of their body mass/day while their mothers foraged at sea, but gained mass rapidly during periods of maternal attendance. Sons gained significantly more body mass (1.9 kg) compared with daughters (1.3 kg) during maternal attendance, suggesting that sons consume more milk. Sex differences in mass gain were unrelated to pup age or body mass. Mass at age 60 days was negatively related to birth date in sons, but positively related to birth mass in daughters. These data indicate that (1) greater maternal resources are expended on sons than on daughters; (2) sons receive greater maternal resources because they are male, and not because of their greater birth mass and body size; (3) different factors appear to be important in determining high postnatal growth in sons and daughters, and (4) demand for resources by sons can influence maternal behavior and ultimately the level of resources received. (Auth. mod.)

B-53520
Wägele, H., Bullough, L.W., Barnes, D.K.A., **Anatomy of *Pseudotritonia* Thiele, 1912 and *Notaeolidia* Eliot, 1905 (Gastropoda: Opisthobranchia: Nudibranchia) from Signy Island, Antarctica,** *Journal of molluscan studies,* May 1995, 61(2), p.209-213, 6 refs.

Several species of nudibranch molluscs are abundant amongst the rich benthic hard substratum communities found close to the British Antarctic Survey base at Signy I. Over the austral summer 1992-1993, two of the authors collected some of the lesser known species of Nudibranchia at depths between 3 and 40 m. New information on morphology and anatomy of two of these species, *Pseudotritonia gracilidens* Odhner, 1944 (Charcotiidae, Arminoidea) and *Notaeolidia gigas* Eliot, 1905 (Notaeolidiidae, Aeolidoidea) are presented in this paper. The validity of the species *N. gigas* is strengthened. (Auth.)

B-53521
Davenport, J., Chown, S.L., **Air-breathing by tightly-closed intertidal molluscs: benefits of small size to *Laevilitorina caliginosa* (Gould, 1846) and *Lasaea consanguinea* (Smith, 1879) living at Husvik, South Georgia,** *Journal of molluscan studies,* May 1995, 61(2), p.292-294, 11 refs.

Three tiny molluscs are frequently left stranded but wet in pools or damp rocks as South Georgia tides retreat. During periods of high barometric pressure, particularly with neap tides, the small creatures may be left uncovered by high tides for 7-10 days. During the study period in these conditions they showed no gaping, i.e. interacting with the atmosphere, nor did they have air bubbles in the mantle when returned to the sea. The combination of small size, immediate high activity levels in sea water, plus regular prolonged exposure to air suggested that at least two of the species might be capable of taking up oxygen from the atmosphere when emersed.

B-53522
Shreeve, R.S., Hayward, P.J., **Cyphonautes larva (Bryozoa: Gymnolaemata) from the Bellingshausen Sea, Antarctica,** *Marine Biological Association of the United Kingdom. Journal,* May 1995, 75(2), p.499-501, 9 refs.

This note describes the first cyphonautes larva (Bryozoa: Gymnolaemata) to be reported from antarctic seas. It was found in samples taken in mid-water (600-250 m depth) beneath the ice in the Bellingshausen Sea, in the austral summer. From its external characteristics it appears to be the larva of a species of the ctenostomate genus *Alcyonidium.* The only species of this genus known in the antarctic are *A. flabelliforme* Kirkpatrick and *A. eightsi* Winston and Hayward. (Auth.)

B-53525
Nicolaus, B., Manca, M.C., Lama, L., Esposito, E., Gambacorta, A., **Effects of growth temperature on the polar lipid pattern and fatty acid composition of seven thermophilic isolates from the antarctic continent,** *Systematic and applied microbiology,* May 1995, 18(1), p.32-36, 16 refs.

Seven thermophilic strains isolated from different geographical areas of the antarctic continent were examined for their polar lipid pattern and fatty acid composition. Temperature-induced changes in membrane lipids were also analyzed. They involved the relative proportions of different polar lipids and the synthesis of higher melting point fatty acids, which was favored by high temperatures. Taxonomic implications on the basis of fatty acid analysis are reported. (Auth.)

B-53526
Guinet, C., Bouvier, J., **Development of intentional stranding hunting techniques in killer whale *(Orcinus orca)* calves at Crozet Archipelago,** *Canadian journal of zoology,* Jan. 1995, 73(1), p.27-33, With French summary. 23 refs.

This paper describes the trend in the practice of what the authors interpret to be the "intentional stranding" hunting technique of 2 juvenile female killer whales *(Orcinus orca),* A4 and A5, belonging to pod A on the beaches of Possession I. Pod A was composed of 3 adult females, A2, A3, A6, and one adult male, A1. A2 is A4's mother and A3 is A5's mother. Observations indicate that at Crozet Archipelago, juvenile killer whales first practiced intentional stranding on their own when they were 4-5 years old. Their first attempt to capture elephant seal pups by means of this technique was observed when they were 5-6 years old. However, 5- to 6-year old juveniles still needed the assistance of an adult female to return to the water with their prey. This study indicates that learning hunting techniques needs a high degree of skill and requires high parental investment to reduce the associated risk. Furthermore, social transfer through apprenticeship is probably one of the mechanisms that enables the high degree of adaptability observed in killer whales. (Auth.)

B-53532
Wharton, D.A., Ferns, D.J., **Survival of intracellular freezing by the antarctic nematode *Panagrolaimus davidi*,** *Journal of experimental biology,* June 1995, 198(6), p.1381-1387, Refs. p.1386-1387.

DLC QH301.J68

The authors have observed freezing and melting in all body compartments, including intracellular compartments, of the antarctic nematode *Panagrolaimus davidi.* Inoculative freezing from the surrounding water occurs via the body openings, rather than across the cuticle; most frequently it occurs via the excretory pore. Individual nematodes that have frozen intracellularly will subsequently grow and reproduce in culture. Determining the mechanisms by which this nematode survives intracellular freezing could have important applications in the cryopreservation of a variety of biological materials. (Auth. mod.)

B-53537
Sieg, J., ed, Wägele, J.W., ed, **Antarctic fauna** [Fauna der Antarktis], Berlin, Paul Parey, 1990, 214p., In German.

DLC QL126.5.F38

This is a guide to the ecology and taxonomy of antarctic deep-sea fauna. A species selection is introduced in classified groups, including descriptions of the animals' morphologic characteristics and their abundances and habitat.

B-53547
Robinson, D.H., Arrigo, K.R., Iturriaga, R., Sullivan, C.W., **Microalgal light-harvesting in extreme low-light environments in McMurdo Sound, Antarctica,** *Journal of phycology,* Aug. 1995, 31(4), p.508-520, Refs. p.518-520.

Microalgal pigment composition, photosynthetic characteristics, single-cell absorption efficiency spectra, and fluorescence-excitation (FE) spectra were determined for platelet ice and benthic communities underlying fast ice in McMurdo Sound during austral spring 1988. Measurements of spectral irradiance and photosynthetically active radiation (PAR) as well as samples for particulate absorption measurements were taken directly under the congelation ice, within the platelet layer, as profiles vertically through the water column, and at the benthic surface. Light attenuation by sea ice, algal pigments, and particulates reduced PAR reaching the platelet ice layer to 3% of surface values and narrowed its spectral distribution to a band between 400 and 580 nm. Attenuation by the water column further reduced PAR reaching the sea floor (28 m depth) to 0.05% of surface levels, with a spectral distribution dominated by 470-580 nm wavelengths. Results suggest that underice algae employ complementary pigmentation and maximize absorption efficiency as adaptive strategies to low-light stress. Regulating the distribution of absorbed energy between PSI and PSII may be an adaptive response to the restricted spectral distribution of irradiance. (Auth. mod.)

B-53571
Compagna, C., Le Boeuf, B.J., Blackwell, S.B., Crocker, D.E., Quintana, F., **Diving behaviour and foraging location of female southern elephant seals from Patagonia,** *Journal of zoology,* May 1995, 236(1), p.55-71, 45 refs.

This elephant seal colony is unusual in two respects: it is removed from deep water by a broad shallow shelf 345-630 km wide, and colony numbers have been increasing in recent years in contrast to numbers from other Southern Hemisphere colonies that are stable or in decline. Microprocessor-controlled geolocation-time-depth recorders were deployed on four females, recording a total of 15,836 dives (270 dive days) from Feb. to Apr., 1992. Departing seals crossed the continental shelf quickly (54.5-62.1 h) and did not show signs of foraging until reaching deep water, due east of the colony in the South Atlantic Ocean. Diving was virtually continuous with overall mean rates of 2.5 dives/h, mean dive durations of 22.8 min (maximum dive duration=79 min) with 1.6 min surface intervals between dives, and dive depths of 431 m (maximum dive depth=1,072 m). The diving pattern of females from Patagonia is similar to that of seals from colonies where numbers are decreasing (Macquarie stock) or are stable (South Georgia I.). Patagonian subjects did not, however, feed in or south of the Antarctic Polar Front, or in cold waters along the antarctic coast, where seals from declining or stable colonies forage. (Auth. mod.)

B-53572

Petyt, C., **Behaviour of seabirds around fishing trawlers in New Zealand subantarctic waters,** *Notornis,* June 1995, 42(2), p.99-115, 22 refs.

Observations of birds were made while working on fishing trawlers intermittently for almost a year in New Zealand subantarctic waters. Large numbers of several species of albatrosses and petrels are attracted to trawlers to scavenge; their numbers vary throughout the year. Scavenging behavior around trawlers is discussed. There seems to have been an increase in scavenging by certain species in the last 30 years. (Auth.)

B-53574

SCAR Group of Specialists on Seals, **Antarctic pack ice seals: indicators of environmental change and contributors to carbon flux,** July 1993, 11p., SCAR Group of Specialist on Seals Workshop, St. Paul, MN, May 4-6, 1993. Draft prospectus. 21 refs.

Recognizing the important need for a better understanding of the pack ice seals and the role that they play in the antarctic marine ecosystem, the Group of Specialists on Seals has recommended that a coordinated, multinational research initiative be developed: the Antarctic Pack Ice Seals (APIS) Program. The APIS Program will produce information of value to several antarctic research programs and inter-governmental organizations. Some of these programs, and the expected contributions to them from the APIS Program, are described. Several areas of research are closely linked; these areas have been formulated as questions posed to address hypotheses regarding seals' roles in the pack ice ecosystem. The interactions between the major questions and related research activities are indicated in a table.

B-53580

Morrone, J.J., **Cladistic placement of the subantarctic genus *Haversiella* (Coleoptera: Curculionidae),** *Journal of the New York Entomological Society,* July 1994, 102(3), p.299-302, 14 refs.

Haversiella Schweiger is comprised of a single species, *H. albolimbata* (Champion), which is recognized by body vestiture lacking setae, maxillary mala lacking teeth, subcircular pronotum, postocular lobes absent, scutellum very reduced, elongate elytra, tibiae lacking spurs, and reduced plate of female sternum 8. This genus belongs in the tribe Rhytirrhinini and is the sister genus to *Neopachytychius* Hustache. Both genera are part of a larger monophyletic group that includes *Palaechtus* Waterhouse and related genera from Tristan da Cunha-Gough, and the American genera *Listronotus* Jekel and *Lixellus* LeConte. *H. albolimbata* is distributed in the Falkland Is. and the Magellanic moorland of southern Argentina and Chile. (Auth.)

B-53581

McDonald, S.J., Kennicutt, M.C., II, Liu, H., Safe, S.H., **Assessing aromatic hydrocarbon exposure in antarctic fish captured near Palmer and McMurdo Stations, Antarctica,** *Archives of environmental contamination and toxicology,* Aug. 1995, 29(2), p.232-240, Refs. p.239-240.

Since little is known about the effects of contaminants on antarctic organisms, the effects of polynuclear aromatic hydrocarbons (PAH) on antarctic fish were evaluated. Fish captured near Palmer Station exhibited induced ethoxyresorufin O-deethylase (EROD) activities and elevated concentrations of biliary PAH metabolites compared to fish from control sites. Naphthalene and phenanthrene PAH metabolite levels were significantly higher in the bile of fish captured near McMurdo Station than in fish from remote sites in McMurdo Sound. Laboratory experiments were conducted in which *Notothenia gibberifrons* were treated with benzo[a]pyrene (BaP) and diesel fuel Arctic (DFA). Although DFA is composed primarily of 2- and 3-ring PAH which are not known to be potent CYPIA inducers, the maximal hepatic EROD activity of DFA-treated fish was approximately 80% of that observed in BaP-treated fish. (Auth. mod.)

B-53582

Yu, Y., Wade, T.L., Fang, J., McDonald, S., Brooks, J.M., **Gas chromatographic-mass spectrometric analysis of polycyclic aromatic hydrocarbon metabolites in antarctic fish *(Notothenia gibberifrons)* injected with Diesel Fuel Arctic,** *Archives of environmental contamination and toxicology,* Aug. 1995, 29(2), p.241-246, 13 refs.

Fish *(Notothenia gibberifrons)* collected in pristine antarctic sites were injected with Diesel Fuel Arctic (DFA). Gas chromatography/mass spectrometry (GC/MS) was used to identify and quantify polycyclic aromatic hydrocarbon (PAH) metabolites obtained from hydrolyzed fish bile. The concentrations of naphthols (NPH), phenanthrenols (PHN), dibenzothiophenols (DBT), and total PAH metabolites (ΣPAH) vary with time. The response curve (production of PAH metabolites vs. time) resembled a Sigmoid curve, with an initial low response at 24 h followed by a rapid rise in production of PAH metabolites 120 h after exposure to DFA. PAH metabolites identified include NPH, PHN, and DBT and their alkylated derivatives, reflecting the composition of the DFA to which the fish were exposed. The GC/MS technique is highly sensitive, particularly in the detection of multi-ring PAH metabolites. The results suggest that analysis of PAH metabolites is a valuable tool for environmental monitoring and assessment of exposure to petroleum. (Auth.)

B-53583

Bargagli, R., Brown, D.H., Nelli, L., **Metal biomonitoring with mosses: procedures for correcting for soil contamination,** *Environmental pollution,* 1995, 89(2), p.169-175, Refs. p.174-175.

Highly variable total concentrations of 15 elements have been found in five species of epigeic mosses growing in remote areas of Italy and in northern Victoria Land. It is likely that soil particles entrapped in the mosses cause these high element concentration differences, thereby leading to inexact interpretations of baseline concentrations and of element distribution in different parts of mosses. A simple procedure for estimating more plausible background values, which consists of subtracting the substratum contribution from raw concentrations of elements in mosses, is reported. The normalization of total concentrations to the regional soil composition is also emphasized, in order to point out other possible metal sources. (Auth.)

B-53598

Davenport, J., **Upwelling-generated plankton strandlines: important predictable food sources for seabirds at Husvik, South Georgia,** *Marine biology,* Aug. 1995, 123(2), p.207-217, 24 refs.

Sustained strong offshore winds generate upwelling in the fjords of northern South Georgia. Deepwater plankton is "pumped" by upwelling towards sandy beaches at the heads of the fjords; calanoid copepods, chaetognaths and pteropods are stranded by the sand "filter" in large quantities on falling tides. Local benthonic species (harpacticoid copepods and amphipods) are present in the plankton but do not strand. Strandlines are very rich (<4 kg wet mass/m^2) and provide large fractions of the food of kelp gulls, sheathbills and terns in the austral summer. Birds can only exploit fresh strandlines, since air-drying of the plankton soon makes it too salty to eat. (Auth.)

B-53599

Siegel, V., Loeb, V., **Recruitment of antarctic krill *Euphausia superba* and possible causes for its variability,** *Marine ecology progress series,* July 20, 1995, 123(1-3), p.45-56, 39 refs.

Between-year variability of krill year class success and recruitment during the 1977 to 1994 period are described based on data from German expeditions and U.S. Antarctic Marine Living Resources Program cruises in the Elephant I. area. The recruitment index (R_1), based on the relative abundance of the 1+ age class, varies substantially between years, whereas it is quite similar between different surveys within the same field season. The overall mean recruitment index for all years was R_{mean}=0.210. Good recruitment was observed for the 1980-81, 1985-86, 1987-88, and 1990-91 year classes; poor recruitment occurred for the 1976-77, 1982-83, 1983-84, 1988-89, 1991-92 and 1992-93 year classes. Pairwise correlations between the stock parameters, recruitment indices, and available environmental data indicate that good and poor year class success are directly and indirectly related to sea ice conditions during the preceding winter season, the timing of krill spawning, and the occurrence of dense salp concentrations. No correlation is shown with upper water column temperature or krill stock/spawning stock size. A concept is developed describing the interactions of various parameters leading to good or poor krill recruitment. (Auth.)

B-53600

Barthel, D., **Tissue composition of sponges from the Weddell Sea, Antarctica: not much meat on the bones,** *Marine ecology progress series,* July 20, 1995, 123(1-3), p.149-153, 23 refs.

The tissue of 31 demosponge and 7 hexactinellid species was analyzed for its composition of organic and inorganic matter. With one exception *(Haliclona* cf. *gaussiana)* inorganic matter, i.e. mostly the siliceous skeleton, accounted for most of the dry weight, varying between about 60 and 95% dry wt. There were no general trends in the ratio of organic to inorganic matter within sponge orders or genera, and within one species, the ratio could vary between stations. For one of the hexactinellids, *Bathydorus spinosus,* several size classes were analyzed and there was no systematic change in the organic inorganic matter ratio with specimen size. For some species the results from the Weddell Sea sponges are in good agreement with earlier data from McMurdo Sound. The low organic matter content in Weddell Sea sponges implies that sponge biomasses are much lower than hitherto assumed on the basis of their high abundances and large sizes. (Auth. mod.)

B-53601

Delille, D., Fiala, M., Rosiers, C., **Seasonal changes in the phytoplankton and bacterioplankton distribution at the ice-water interface in the antarctic neritic area,** *Marine ecology progress series,* July 20, 1995, 123(1-3), p.225-233, 75 refs.

To determine the relationship between phytoplankton and bacteria biomass near the ice-water interface in the Antarctic, the seasonal distributions of phytoplankton and bacteria populations were investigated on the continental shelf of Adélie Coast during the ice coverage period. An under-ice surface station was sampled weekly from Mar. 1991 to Jan. 1992 for the bottom ice and for surface, 0.5 and 2 m depth seawater. Seawater chlorophyll *a* values ranged from 0.9 mg/m^3 in summer to 0.01 mg/m^3 in winter. Values 50 times higher were recorded in the overlying ice. Bacterial abundance ranged from 0.5×10^{11} $cells/m^3$ in July to 6.0×10^{11} $cells/m^3$ after the ice break-up. Values reaching up to 2.5×10^{12} $cells/m^3$ were recorded in sea ice. Bacterial biomass and chlorophyll *a* concentrations were significantly correlated in both sea ice and underlying seawater. (Auth. mod.)

B-53606

Favero, M., **Breeding biology of the sheathbill *Chionis alba* on South Shetland Is.** [Biología reproductiva de la paloma Antártica, *Chionis alba* (Charadriiformes) en las Islas Shetland del Sur, Antártida], *Rivista italiana di ornitologia,* June 15, 1993, 63(1), p.33-40, In Spanish with English and Italian summaries. 12 refs.

DLC QL690.I8R58

The breeding biology of the Greater Sheathbill, *Chionis alba* was studied at South Shetland Is. between 1988 and 1991. Timing of the main breeding events is given together with breeding habitat characteristics, clutch size, chick growth (weight, culmen, tarsus and wing length), and breeding success. The data are compared with those reported by other authors. (Auth.)

B-53607

Montalti, D., Coria, N.R., **Stomach-flushing technique to obtain stomach content samples in antarctic seabirds** [El uso de la tecnica de lavados de estómagos para obtener muestras de contenidos estomacales en aves marinas antárticas], *Rivista italiana di ornitologia,* June 15, 1993, 63(1), p.69-73, In Spanish with English and Italian summaries. 23 refs.

DLC QL690.I8R58

The stomach flushing technique to obtain complete stomach content samples was used on Black-bellied Storm Petrels, Giant Petrels, Brown Skuas and Greater Sheathbills. Examination of the contents showed that the technique is effective. It is pointed out that multiple flushes are essential to empty the stomachs of the four species of seabirds examined. (Auth.)

B-53608

Favero, M., Bellagamba, P.J., Farenga, M., **Abundance and distribution of bird populations at The Toe and Harmony Point, Nelson Island** [Abundancia y distribución especial de las poblaciones de aves de Punta Armonía y Punta Dedo, Isla Nelson, Shetland del Sur], *Rivista italiana di ornitologia,* Dec. 1991, 61(3-4), p.85-96, In Spanish with English and Italian summaries. 18 refs.

DLC QL690.I8R58

Bird counts were carried out on Nelson I. between Oct. 1988-Feb. 1989 and in Jan. 1990. The authors found 11 breeding species with a total of approximately 125,000 pairs: *Pygoscelis papua* (4,000 pairs); *P. antarctica* (120,000); *Macronectes giganteus* (500); *Daption capensis* (300); *Oceanites oceanicus, Fregetta tropica, Phalacrocorax atriceps* (110), *Chionis alba* (110); *Larus dominicanus* (120); *Sterna vittata* (30) and *Catharacta skua lonnberghi* (40). The distribution of colonies is associated with geomorphological characteristics. Populations in relation to censuses carried out in 1903, 1965 and 1966 show annual increases of 1.65-5.21 for penguins and of 0.71-7.99 for flying birds. (Auth.)

B-53609

Andriiashev, A.P., **New species of Patagonian liparidid fishes of the genus *Careproctus* (Scorpaeniformes, Liparididae). Report 2,** *Journal of ichthyology,* 1992, 32(1), p.38-49, Translated from Voprosy ikhtiologii 31(5), 1991. 6 refs.

Four new fish species of the genus *Careproctus* Kroyer taken on the drop-off of the continental slope of Argentina are described: *C. atrans* (north of the Falkland Is., depth-1300 m), *C. aureomarginatus* (south of the Falklands, depth 1660-1663 m), *C. aculeolatus* (north of the Falklands, depth 700 m), and *C. acaecas* (north of the Falklands, depth 750 m). (Auth.)

B-53610

Pakhomov, E.A., Tseĭtlin, V.B., **Diet of seven species of antarctic fishes and estimation of their daily rations,** *Journal of ichthyology,* Dec. 1992, 32(5), p.31-41, Translated from Voprosy ikhtiologii 32(1), 1992. 23 refs.

Based on sampling in Mar. 1988 in the Cosmonaut Sea, the qualitative and quantitative composition of the diet of seven species of antarctic fishes are examined. The fish species are classified by type of feeding. Daily consumption of food is estimated, and seasonal and annual rations as well as consumption of krill *(Euphausia superba)* by the dominant species of the Cosmonaut Sea ichthyofauna are calculated. The inapplicability of generally accepted methods for calculating rations for marine fishes is discussed. (Auth.)

B-53614

Block, W., Convey, P., **Biology, life cycle and ecophysiology of the antarctic mite *Alaskozetes antarcticus*,** *Journal of zoology,* July 1995, 236(3), p.431-449, Refs. p.447-449.

The cryptostigmatid mite *Alaskozetes antarcticus* (Michael) is a dominant member of many terrestrial communities in the maritime Antarctic, where it survives extreme temperatures, short cold summers, numerous freeze-thaw cycles, desiccating conditions and a limited season for growth and reproduction. However, examination of features of its biology, from morphology through life-history strategy to physiology, indicate very little specialization to the antarctic environment. *A. antarcticus* is a herbivore/detritivore, typical of the Cryptostigmata in general, with low feeding and growth rates, long life span and low reproductive output. Over-wintering survival, involving supercooling enhanced by the use of antifreezes such as glycerol, although initially described in antarctic species, is now known to be characteristic of many temperate relatives, so it is not a specific adaptation to the polar environment. The obvious success of *A. antarcticus* in maritime antarctic terrestrial environments must be attributed to a combination of several features characteristic of the Cryptostigmata in general, rather than to specific polar adaptations. (Auth. mod.)

B-53621

Acierno, R., Macdonald, J.A., Agnisola, C., Tota, B., **Blood volume in the hemoglobinless antarctic teleost *Chionodraco hamatus* (Lönnberg),** *Journal of experimental zoology,* Aug. 1, 1995, 272(5), p.407-409, 15 refs.

Blood volume in the hemoglobinless antarctic icefish *Chionodraco hamatus* (Channichthyidae) has been determined by the Evans blue dye dilution technique. A mean blood volume of 127.0±5.0 ml/kg body weight was found, a value even higher than that previously found in another icefish, *Chaenocephalus aceratus* (mean blood volume, 89.7 ml/kg body weight). This extraordinary hypervolemia appears unique among teleosts and may compensate for the absence of hemoglobin in the icefish. (Auth.)

B-53622

Davis, T.A., Nguyen, H.V., Costa, D.P., Reeds, P.J., **Amino acid composition of pinniped milk,** *Comparative biochemistry and physiology,* Mar. 1995, 110B(3), p.633-639, 15 refs.

The total amino acid concentration and the amino acid pattern, i.e. the relative proportion of each amino acid (protein-bound plus free) to the total amino acids, in the milks of the northern elephant seal, antarctic fur seal, California sea lion, and Australian sea lion were determined. Total amino acid concentration was 10% (w/v) or greater and did not vary significantly among species. The most abundant amino acids in the milks of all species were glutamate, proline and leucine. Essential amino acids were 40%, branched-chain amino acids were 20%, and sulfur amino acids were 4% of the total milk amino acids in all species. There were differences among the pinnipeds in some of the individual amino acids. There was little effect of stage of lactation on total amino acid concentration or amino acid pattern in pinniped milk. Comparison of milk from the four pinniped species with that of 14 other mammalian species suggests commonality in milk amino acid pattern despite the wide variation in total amino acid concentration among the species. (Auth. mod.)

B-53629

Schumacher, U., Klein, P., Plötz, J., Welsch, U., **Histological, histochemical, and ultrastructural investigations on the gastrointestinal system of antarctic seals: Weddell Seal *(Leptonychotes weddellii)* and crabeater seal *(Lobodon carcinophagus)*,** *Journal of morphology,* Aug. 1995, 225(2), p.229-249, 39 refs.

Histologically examined by light microscopy, the tissue layers of the gastrointestinal tract of Weddell and crabeater seals are almost identical to those observed in most other mammals and no major differences in principal organization could be found between the two seal species. The ultrastructure of the gastric and intestinal epithelial cells is also closely comparable to that of these cells in other mammals; however, Paneth cells have not been found in this study. Adaptations of the gastrointestinal tract to the aquatic environment or the diet are hence not obvious at the morphological levels of organization studied. Histochemical differences are found between the two closely related species: mucins of the surface epithelium in the stomach of Weddell seals are highly sulfated, while those in the crabeater seal are not. Mucous neck cells in Weddell seals contain acid mucosubstances, while those of crabeater seals contain neutral ones. Goblet cells in the small and large intestine in Weddell seals contain both neutral and acid mucosubstances. Both mucin types are detected in the crabeater seal; however, the mucins of the colon in the crabeater seal are more highly sulfated than those in the Weddell seal. (Auth. mod.)

B-53634

Davis, R.W., Wartzok, D., Elsner, R., Stone, H., **Small video camera attached to a Weddell seal: a new way to observe diving behavior,** Marine Mammal Sensory Systems: Symposium on Sensory Systems of Aquatic Animals, Oct. 1991, Moscow, Russian Federation. Proceedings. Edited by J.A. Thomas, R.A. Kastelein, and A.IA. Supin, New York, Plenum Press, 1992, p.631-642, 39 refs.

DLC QL713.2.M26 1992

To provide new information on the underwater behavior of pinnipeds, a small, self-contained underwater video system that can be attached to an animal's back was developed. As an initial test, the video system was attached to a juvenile Weddell seal making voluntary dives in McMurdo Sound. The objectives of this preliminary study were to determine: the feasibility of attaching a video system to a free-diving seal, the behavioral reaction of the seal to the camera, and the type and quality of behavioral information that could be obtained from such a system. Initial results of this enterprise are presented particularly regarding what information can be seen or deduced from film exposed in this low-light environment. (Auth. mod.)

B-53646

Zinsmeister, W.J., Griffin, M., **Late Cretaceous and Tertiary aporrhaid gastropods from the southern rim of the Pacific Ocean,** *Journal of paleontology,* July 1995, 69(4), p.692-702, 36 refs.

The new subfamily Struthiopterinae is proposed for these gastropods. The following genera are placed within the Struthiopterinae: *Struthioptera* Finlay and Marwick, 1937; *Austroaporrhais* n. gen.; and *Struthiochenopus* n. gen. The temporal and biogeographic distribution of members of Struthiopterinae show a similar pattern to other Southern Hemisphere groups of Late Cretaceous and early Cenozoic molluscs with initial disappearance from western Australasia of the Weddellian Province by the Paleocene while surviving in Antarctica until the late Eocene and eventually disappearing in southern South America during the early Miocene. Also included in this paper is a reappraisal of the species assignable to these genera from Late Cretaceous and early Tertiary of New Zealand, Antarctica, and southern South America together with the description of five new species. The following new species of the Struthiopterinae are described: *Austroaporrhais larseni* n.sp., *A. stilwelli* n.sp., *A. dorotensis* n.sp., *Struthiochenopus antarcticus* n.sp., and *S. philippii* n.sp. (Auth.)

B-53650

John, D.M., Pugh, P.J.A., Tittley, I., **Observations on the benthic marine algal flora of South Georgia: a floristic and ecological analysis,** *Natural History Museum. Bulletin. Botany series,* Nov. 24, 1994, 24(2), p.101-114, Refs. p.113-114.

The pattern of littoral zonation of benthic algae on rocky and boulder shores in Husvik Harbour, on the northeast coast of South Georgia was investigated during the austral summer of 1990-91. Distribution patterns are similar to those on other shores in the subantarctic region of the southern ocean, except for the absence in the littoral fringe of a *Hildenbrandia* or *Hildenbrandia-Bostrychia* association. The supralittoral fringe is devoid of macroalgae and gives way to a eulittoral zone consisting of a series of belts. An uppermost belt dominated by *Porphyra* followed by ones dominated or co-dominated by *Nothogenia fastigiata, Iridaea cordata,* and *Adenocystis utricularia.* The lowermost belt is either dominated by *Palmaria georgica* or co-dominated by this red alga and *Schizoseris condensata.* The upper vertical limit of crustose coralline algae and the kelps *Macrocystis pyrifera* and *Durvillaea antarctica* define the sublittoral fringe; the latter is only present on wave-exposed shores. The 103 species of algae known from South Georgia are critically evaluated; 4 are endemics and 12 are known only from South Georgia and Tierra del Fuego. (Auth. mod.)

B-53653

Slattery, M., McClintock, J.B., Heine, J.N., **Chemical defenses in antarctic soft corals: evidence for antifouling compounds,** *Journal of experimental marine biology and ecology,* July 27, 1995, 190(1), p.61-77, Refs. p.74-77.

Organic extracts from the antarctic soft corals *Alcyonium paessleri* May and *Gersemia antarctica* Kukenthal exhibit antimicrobial and antifoulant activity. A third soft coral, the stoloniferan *Clavularia frankliniana* Roule, exhibits no such bioactivity. Marine bacterial attachment was inhibited in the presence of chloroform and aqueous methanol extracts of *A. paessleri* and *G. antarctica,* but not in the presence of solvent controls. Similarly, inhibition of microbial growth in three sympatric species of antarctic marine bacteria occurred in response to aqueous methanol extracts of these two soft corals, but not to the controls. Antifoulant activity of chloroform extracts of *A. paessleri* and *G. antarctica* was detected in a month-long field assay measuring inhibition of benthic diatom settlement. Observed invertebrate recruitment rates were too low to allow an evaluation of antifoulant bioactivity. Laboratory growth experiments, employing the diatom *Navicula* sp. and larvae of the sea urchin *Sterechinus neumayeri* Meissner, confirmed the presence of growth-inhibiting metabolites in the soft corals *A. paessleri* and *G. antarctica.* These results suggest that both *A. paessleri* and *G. antarctica,* which do not appear to be fouled in the field, possess bioactive compounds with antifoulant activity. In contrast, *C. frankliniana* appears to lack antifouling compounds. (Auth.)

B-53684
Pütz, K., **Post-moult diet of emperor penguins *(Aptenodytes forsteri)* in the eastern Weddell Sea, Antarctica,** *Polar biology,* Aug. 1995, 15(7), p.457-463, Refs. p.462-463.

The diet of emperor penguins was studied during late austral summer at Drescher Inlet, eastern Weddell Sea. Krill was a major component of the food, accounting for 75% of all prey items. Emperor penguins appear to feed on krill during shallow dives under the fast sea ice. Fish, mainly nototheniids, accounted for less than 20% by number of all prey. All evaluation of the main prey types in terms of mass indicated, however, that fish represented up to ca. 75% of prey mass. Feeding experiments were performed on captive penguins and showed that squid beaks can accumulate for up to 3 weeks within the stomach without any clear signs of erosion. The lack of cephalopod soft parts in the samples makes it likely that all squid beaks were derived from animals captured some time previously. Squid seems to be a very minor dietary component of emperor penguins at the Dreschler Inlet. (Auth.)

B-53685
Andreoli, C., Tolomio, C., Moro, I., Radice, M., Moschin, E., Bellato, S., **Diatoms and dinoflagellates in Terra Nova Bay (Ross Sea-Antarctica) during austral summer 1990,** *Polar biology,* Aug. 1995, 15(7), p.465-475, Refs. p.474-475.

During Jan.-Feb. 1990 the floristic composition and biomass of diatoms and dinoflagellates in Terra Nova Bay were investigated. The study area included eight stations, seven of which were inshore and one offshore. Of the 94 taxa identified, 58 were diatoms and 34 were dinoflagellates. Cell densities were higher in surface layers and particularly at two stations, one located at the center of the bay and the other south of Terra Nova Station. While density data showed that the diatoms predominated over the dinoflagellates and over *Phaeocystis* sp., the biomass values were largely made up of dinoflagellates. (Auth.)

B-53686
Tell, G., Vinocur, A., Izaguirre, I., **Cyanophyta of lakes and ponds of Hope Bay, Antarctic Peninsula,** *Polar biology,* Aug. 1995, 15(7), p.503-509, 20 refs.

This paper presents the results of the floristic inventory of freshwater Cyanophyceae found in plankton samples from nine lakes and ponds at Hope Bay. Forty taxa were recorded, of which nine are new records for Antarctica. All the taxa are illustrated, and their distribution in Antarctica as well as the ecological characteristics of the sampling sites are given. The main morphological features and the geographic distribution are also given for the new records. (Auth.)

B-53687
Guinet, C., Jouventin, P., Malacamp, J., **Satellite remote sensing in monitoring change of seabirds: use of Spot Image in king penguin population increase at Ile aux Cochons, Crozet Archipelago,** *Polar biology,* Aug. 1995, 15(7), p.511-515, 18 refs.

The king penguin colony at Ile aux Cochons, Crozet Archipelago is the largest in the world. The change in its surface area was investigated by means of satellite remote sensing using spot scene, enabling the authors to locate the colony and to determine that the surface area occupied has increased by 56% between 1962 and 1988. The high resolution system available on the spot system which allows at present a 10 m ground resolution, and 5 m in the near future, can thus be a useful tool for monitoring medium to long-term changes in marine bird populations breeding in colonies composed of birds spaced a constant distance from one another. Based on the surface area occupied by the colony and the published data on the population size on Possession I., as well as information on the breeding frequency of the species, the authors estimate that the total breeding population is about 1,000,000 pairs for the whole archipelago, and that about 70% of birds breed at Ile aux Cochons. (Auth.)

B-53688
Ernsting, G., Van Ginkel, W., Menken, S.B.J., **Genetical population structure of *Trechisibus antarcticus* (Coleoptera; Carabidae) on South Georgia and on the Falkland Islands,** *Polar biology,* Aug. 1995, 15(7), p.523-525, 12 refs.

Samples of *Trechisibus antarcticus* (Coleoptera, Carabidae) collected on South Georgia and the Falkland Is. were analyzed at 8 polymorphic allozyme loci, related to the supposition of a recent arrival of this species on South Georgia. The data showed absence of rare alleles in the South Georgia sample, but otherwise a strong similarity between the two populations. (Auth.)

B-53694
Wägele, J.W., Brito, T.A.S., **Sublittoral fauna of the maritime antarctic: first underwater observations in Admiralty Bay** [Die sublitorale Fauna der maritimen Antarktis: Erste Unterwasserbeobachtungen in der Admiralitätsbucht], *Natur und Museum,* Sep. 1990, 120(9), p.269-282, In German. Numerous refs.

DLC QH5.S4

Admiralty Bay, lying on the SE coast of King George Island, is the largest bay on the island. Its many physical features include several inlets, fjords, rocks, and glaciers which front on the Bay. The depth to bottom ranges from about 5 m nearshore to 500 m in a trench at the center of the Bay, matching the depth of Bransfield Strait which separates King George Island from the Antarctic Peninsula. Among the many marine life forms found in the Bay are polychetes, gastropods, isopods, echinoderms, coelenterates, bryozoans, and thallophytes. This paper discusses the nature and characteristics of these bottom dwellers and their environment. Tables, graphs, charts, and photographs are included.

B-53698
Fanta, E., Luvizotto, M.F., Meyer, A.A., **Gill structure of the antarctic fishes *Notothenia (Gobionotothen) gibberifrons* and *Trematomus newnesi,* Nototheniidae stressed by salinity changes and some behavioral consequences,** *Antarctic record,* Mar. 1995, 39(1), p.25-39, With Japanese summary. Refs. p.38-39.

In coastal antarctic regions, melting and freezing affect water salinity. The aim of this study was to compare morphological changes of branchial epithelial cells in two species of antarctic fishes, *Notothenia (Gobionotothen) gibberifrons* and *Trematomus newnesi,* and to detect behavioral consequences; they occur in Admiralty Bay, during summer in a mean salinity of 32 per mill. Tests were conducted in the salinity range between 26 to 38 per mill. Chloride cells in *T. newnesi* are roundish or elongated, with a small apex at 32 per mill, thin with a large apex at low salinity, and roundish with small intrusions at the surface at 38 per mill. Chloride cells are elongated in *N. (G.) gibberifrons* at normal and low salinity, and increase in number, size and activity at 38 per mill with large intrusions at the apical surface. In both species, mucous cells increase in volume, number and activity with salinity increase, being less active at low salinity. Epithelia detachments are observed at high salinity in *T. newnesi* and in low salinity in *N. (G.) gibberifrons.* (Auth. mod.)

B-53705
Chastel, O., **Influence of reproductive success on breeding frequency in four southern petrels,** *Ibis,* July 1995, 137(3), p.360-363, 26 refs.

Patterns of breeding frequency of several antarctic petrel species have been studied at Kerguelen and Crozet Islands. The White-headed Petrel (summer breeder) followed an essentially biennial cycle with only 13% of successful individuals breeding again the next year. The Great-winged Petrel (winter breeder) was mainly an annual breeder with 78% of successful birds breeding again the next year. Both White-chinned (summer breeder) and Grey Petrels (winter breeder) showed a higher breeding frequency than *Pterodroma* species, with 91 and 93%, respectively, of successful birds returning to breed the following season. These contrasting patterns may be related to the timing of energetic constraints encountered during the interbreeding period, principally the moult and the restoration of breeding condition. It is suggested that these post-breeding constraints are more marked in winter and in oceanic waters, leading to breeding frequencies being lower than in summer and in neritic waters. The intermediate patterns of breeding frequency found in the Great-winged Petrel (mainly annual) and the White-headed Petrel (mainly biennial) show that among Procellariiformes there is a continuum between annual and strictly biennial species. (Auth. mod.)

B-53710

Convey, P., **Growth and survival strategy of the antarctic mite *Alaskozetes antarcticus***, *Ecography,* Jan.-Mar. 1994, 17(1), p.97-107, Refs. p.106-107.

Growth and mortality rates of three juvenile instars and adults of the oribatid mite *Alaskozetes antarcticus* were measured over a 12 month period using field enclosures in its maritime antarctic habitat. A pattern was found of rapid growth during the short summer period followed by gradual weight loss overwinter. Most individuals completed one instar per year, reaching a premoult resting phase by late summer, with the moult being delayed and relatively synchronized early the next summer. After the final moult, adults overwintered again before commencing oviposition, suggesting that the life cycle (egg-egg) will take at least 5 years. Mortality was not biased towards any instar or time of year. Highest individual growth rates were obtained at a constant temperature of 7°C in the laboratory. *A. antarcticus* may be described as a-(adversity) selected, showing an exceptionally long life cycle of 5-6 years and extensive physiological investment in survival adaptations. (Auth. mod.)

B-53711

Block, W., **Differential scanning calorimetry in ecophysiological research,** *Acta Oecologica,* 1994, 15(1), p.13-22, With French summary. 20 refs.

Differential Scanning Calorimetry (DSC) has improved knowledge of the physiological mechanisms underlying the resistance adaptations of many invertebrates. In particular, cold resistance has been examined by low temperature DSC in both freeze-tolerant and freeze-intolerant insects from the maritime Antarctic. Studies have included the investigation of antifreezes, including thermal hysteresis protein activity and ice nucleating agents in both temperate and polar species. Sub-zero glass transitions (vitrification) have been identified as a possible strategy of cryoprotection in some species. Data on ice nucleation obtained by DSC techniques for a variety of arthropods are presented, and the relevance and potential of DSC to ecophysiological research, especially at low temperatures, is discussed. (Auth.)

B-53712

Pugh, P.J.A., **Supercooling points and water content in Acari,** *Acta Oecologica,* 1994, 15(1), p.71-77, With French summary. Refs. p.76-77.

The supercooling point is correlated with total body water content in a wide range of terrestrial Acari from antarctic, subantarctic and temperate regions, which have not been cold-hardened by prior exposure to winter low temperatures. This suggests that low water content is itself an important pre-adaptive feature conferring considerable cold-hardiness among terrestrial mites. Other physiological and behavioral adaptations, for example clearing the gut of potential ice nucleating agents, accumulation of cryoprotectants and behavioral avoidance of low temperatures, are considered to be possible secondary adaptations. (Auth.)

B-53714

Prince, P.A., Rodwell, S.P., **Ageing immature Black-browed and Gray-headed albatrosses using moult, bill and plumage characteristics,** *Emu,* Dec. 1994, 94(4), p.246-254, 7 refs.

The authors describe how to age immature Black-browed and Grey-headed albatrosses up to age 6 years (when they have usually acquired adult characteristics), from a combination of the age and pattern of moult of flight feathers, bill coloration and certain plumage characteristics. This is based on known-age birds retrapped at colonies on Bird Island during the breeding season. Ageing of immatures at other times may be complicated by them being in active moult; further guidance for these circumstance is provided. (Auth.)

B-53716

Ishman, S.E., **Quantitative analysis of antarctic benthic foraminifera: application to paleoenvironmental interpretations,** Columbus, Ohio State University, 1990, 263p., University Microfilms order No.DA91-05134, Ph.D. thesis. Refs. p.255-263.

The use of benthic foraminifera as valuable proxies for paleoenvironmental interpretation has been demonstrated. They are excellent indicators of water mass characteristics (temperature, salinity, dissolved oxygen, etc.), and serve as a useful source of carbonate for stable isotopic analyses. This research investigates the distribution of modern benthic foraminifera from the margin of the Antarctic Peninsula. Statistical quantification of the benthic foraminiferal data demonstrates that two distinct biofacies can be recognized, the Weddell Transitional Biofacies and Marguerite Bay Biofacies. These benthic foraminiferal biofacies are strongly associated with the two dominant deep water masses on the Antarctic Peninsula continental margin, the Weddell Sea Transitional Water and Circumpolar Deep Water. Further quantification of the benthic foraminiferal data suggests distinct distribution patterns within the bays associated with mud and organic carbon content of the surface sediments. (Auth. mod.)

B-53717

Cabrol, N.A., Grin, E.A., **Morphological view on potential niches for exobiology on Mars,** *Planetary and space science,* Jan.-Feb. 1995, 43(1-2), p.179-188, Refs. p.187-188.

The discovery of microbiota in the Dry Valleys of Antarctica has encouraged the construction of new models of Martian ecosystems in order to determine if life could have once existed on Mars. The antarctic cyanobacteria reside just below the surface of sandstone rocks where they are protected from the extreme cold and dry environment. Analogy with the Antarctic Dry Valleys supports speculation that hypothetical microorganisms existed on Mars in the early history of the planet and could have migrated into suitable rocks as the availability of liquid water decreased. (Auth. mod.)

B-53725

Wardell, L.J., **Potential for bioremediation of fuel-contaminated soil in Antarctica,** *Journal of soil contamination,* 1995, 4(2), p.111-121, 26 refs.

A preliminary investigation was conducted to identify the presence of bacteria in fuel-contaminated antarctic soil that could potentially be used to bioremediate the contaminated soil at McMurdo Station and other sites in Antarctica. The ability of soil microorganisms to metabolize fuels under the extreme climatic and oligotrophic conditions of Antarctica was of concern. Bacteria were isolated from fuel-contaminated soil on site at McMurdo. Bacteria from noncontaminated soil near the station were also studied for comparison. The antarctic soil microorganisms exhibited the ability to endure cold and oligotrophic environments. Experiments also showed that bacteria from the fuel spill site were active in their contaminated environment and that acclimation to xenobiotic compounds was necessary. Application of bioremediation in the extreme environmental conditions found at McMurdo were also considered. The possibility of altering environmental factors necessary to adequately support *in situ* bioremediation in this extreme climate is discussed. (Auth.)

B-53728

Drits, A.V., Pasternak, A.F., Tseĭtlin, V.B., **Study of the diel rhythm of feeding in the antarctic copepod, *Calanus propinquus*,** *Oceanology,* 1990 (Pub. June 1991), 30(6), p.740-744, Translated from Okeanologiia. 9 refs.

DLC GC1.O3913

The feeding pattern of the antarctic copepod *Calanus propinquus* was studied in the South Atlantic Ocean at 4 stations, which differed in biomass of phytoplankton. Under constant food conditions in the upper mixed layer the copepods displayed a well-developed feeding pattern. Changes in the concentration of food at various stations led to similar changes in both the daytime and nighttime levels of fullness of the digestive tract. An analysis of the produced data with the aid of a simulation model showed that significant individual differences in the fullness of the digestive tracts of the copepods, which were detected at stations with low phytoplankton biomass, may be caused by the discontinuous nature of feeding of discrete individuals and the heterogeneity of the populations. (Auth.)

B-53729
Stokke, O.S., **Protecting the frozen South,** Green globe yearbook 1992, edited by H.O. Bergesen, M. Norderhaug and G. Parmann, New York, Oxford University Press, 1992, p.133-140, 34 refs.

DLC HC79.E5G69

With the 1959 Antarctic Treaty, the continent entered its highly celebrated era of peaceful scientific co-operation; this regime continues to grow in membership and scope. The Environmental Protocol, adopted in 1991, is the latest move in a long series of regulatory measures produced within this framework. It has attracted considerable public attention because of the fifty-year ban it imposes on mineral activities. In this article, the author first sketches the major environmental threats and evaluates institutional responses, then turns to the mechanisms for change and their impact on the future of the antarctic environmental protection system.

B-53730
Rogers, T., Bryden, M.M., **Predation of Adélie penguins *(Pygoscelis adeliae)* by leopard seals *Hydrurga leptonyx)* in Prydz Bay, Antarctica,** *Canadian journal of zoology,* May 1995, 73(5), p.1001-1004, With French summary. 15 refs.

The behavior of leopard seals feeding on Adélie penguins was investigated between Nov. 1993 and Jan. 1994 in Prydz Bay. The seals were distributed along the fast-ice edge in locations where departing penguins congregated. Five different hunting techniques were observed, four of which were used through most of the summer. Individual leopard seals favored specific hunting techniques. Hitherto, penguin hunting was believed to be carried out primarily by a few male seals; in this study, however, the predation observed involved many different individuals of both sexes. It is estimated that 6 leopard seals feeding in this area over a period of 120 days could consume 2.7% of the adult penguin population. (Auth.)

B-53731
Bevan, R.M., Woakes, A.J., Butler, P.J., Croxall, J.P., **Heart rate and oxygen consumption of exercising gentoo penguins,** *Physiological zoology,* Sep.-Oct. 1995, 68(5), p.855-877, Refs. p.874-877.

Heart rate (f_H) and oxygen consumption (V_{o2}) were recorded from gentoo penguins walking on a variable-speed treadmill. After an initial increase f_H and V_{o2} increased linearly with walking speed. A curvilinear regression equation best described the relationship between f_H and V_{o2}. Over a 3-d period, f_H and V_{o2} were recorded continuously from 6 gentoo penguins that had been injected with doubly labeled water (DLW). When f_H was used to predict V_{o2} over the 3 d, the estimate was not significantly different from the measured V_{o2} with an error (-1.0%) that was less than that produced by the DLW method (+1.6%). The estimate produced by the f_H technique was also accurate when applied both to shorter periods (30 min) and to periods of activity and inactivity. Seven gentoo penguins were also swum in a water channel, and f_H and V_{o2} were again recorded. The relationship between f_H and V_{o2} determined from the birds in the water channel was not significantly different from that obtained from the walking birds. (Auth. mod.)

B-53736
Williams, T.D., Wilson, R.P., Boersma, P.D., Stokes, D.L., **Penguins: *Spheniscidae*,** Bird families of the world, edited by C.M. Perrins, W.J. Bock, and J. Kikkawa, Oxford, UK, Oxford University Press, 1995, 295p., For selected papers see G-53737 and B-53738. Bibliography p.264-287.

DLC QL696.S473W55 1995

The scope of this paper ranges from Antarctica to the Galapagos Islands, touching on the sub-antarctic islands, Patagonia, and the southern and southwestern coastal regions of Africa. Seventeen penguin species are described as to height, weight, down and feathers, coloration, flipper and toe lengths, geographic distribution, and population status. Color plates are included showing eight species as chicks, immatures, and adults. Two chapters on foraging behavior and on conservation of populations are cited separately.

B-53738
Boersma, P.D., Stokes, D.L., **Conservation: threats to penguin populations,** Williams, T.D.: The Penguins: *Spheniscidae*; Bird families of the world, edited by C.M. Perrins, W.J. Bock, and J. Kikkawa, Oxford, UK, Oxford University Press, 1995, p.127-139, Bibliography p.264-287.

The history of penguin success in maintaining species populations indicates that the primary source of decline is human exploitation. While extreme forms of decimation such as penguin harvesting and egg collecting have been nearly eliminated, colony protection due to remoteness of sites may be diminishing as tourism and ship traffic to these remote locations continues to increase.

B-53739
Lannoo, M.J., Eastman, J.T., **Periventricular morphology in the diencephalon of antarctic notothenioid teleosts,** *Journal of comparative neurology,* Jan. 1995, Vol.361, p.95-107, 66 refs.

The authors have examined the subependymal region of the diencephalic third ventricle in notothenioid perciforms and report a pattern of neuropil expansions that appears to be phyletically derived for notothenioids and their outgroups but that is otherwise unique among vertebrates. They recognize five types of expansions based on their composition and width or protrusion into the third ventricle. In the species with the most elaborate morphology, *Trematomus bernacchii,* bilateral subependymal expansions fuse along the midline to form a single sac within the ventricular cavity. The extent of these expansions loosely corresponds with phyletic position but also is correlated with the habitat of cold water. Furthermore, subependymal expansion type is positively correlated with the maximum size of the soma of neurons in two hypothalamic nuclei, the preopticus magnocellularis and the lateralis tuberis. These nuclei project to the pituitary and contain cerebrospinal fluid-contacting neurons. (Auth. mod.)

B-53741
Viarengo, A., Accomando, R., Roma, G., Benatti, U., Damonte, G., Orunesu, M., **Differences in lipid composition of cell membranes from antarctic and Mediterranean scallops,** *Comparative biochemistry and physiology,* Dec. 1994, 109B(4), p.579-584, 21 refs.

Molecular mechanisms evolved in adaptation of cellular membranes to low temperatures have been studied. The lipid composition of membranes from digestive gland cells of two Pectinidae living at different temperatures, such as *Adamussium colbecki* (Smith, 1902), an antarctic mollusc, and *Pecten jacobaeus* L. from the Mediterranean Sea, has been compared. The results demonstrate that cold adaptation of the membranes from Pectinidae digestive gland cells mainly implies the regulation of the ratio of short/long and straight/branched fatty acid chains and of the cholesterol content of membranes. (Auth.)

B-53743
Kawaguchi, S., Satake, M., **Relationship between recruitment of the antarctic krill and the degree of ice cover near the Shetland Islands,** *Fisheries science,* Feb. 1994, Vol.60, p.123-124, 7 refs.

Data on krill size during the fishing season from trawler log books and winter sea ice cover during the period 1979 through 1992 from records of the NAVY-NOAA Joint Ice Center were used to establish a relationship between krill abundance and sea ice cover. A general conclusion may be drawn that heavy ice cover in the austral winter leads to a relatively high abundance of the small-krill population.

B-53744
Crawford, R.M., **Role of sex in the sedimentation of a marine diatom bloom,** *Limnology and oceanography,* Jan. 1995, 40(1), p.200-204, 20 refs.

A longitudinal transect in the Atlantic sector of the southern ocean extending from the ice-covered Weddell Sea across the Antarctic Circumpolar Current and into the Polar Frontal Zone was studied repeatedly during the austral spring. The centric diatom *Corethron criophilum* was found at most stations in variable numbers, but in the Polar Frontal Zone there was a large bloom undergoing a mass sexual phase. This event apparently triggered downward transport of empty diatom cell walls in numbers that suggest the phenomenon is significant for the vertical silica flux and the formation of monospecific layers of this important diatom species in southern ocean sediments. Comparison of the cell-wall dimensions of such a monospecific layer with those in the plankton in the sexual phase reveals a characteristic signature that may indicate the provenance of these layers. (Auth.)

B-53747

Emslie, S.D., **Age and taphonomy of abandoned penguin rookeries in the Antarctic Peninsula region,** *Polar record,* Oct. 1995, 31(179), p.409-418, Refs. p.417-418.

Investigations on the age and taphonomy of modern and abandoned penguin rookeries were completed in the Antarctic Peninsula region, 1992-1994. Systematic collection and identification of bones from modern rookeries of Adélie, chinstrap and gentoo penguins indicate a bias in element preservation for humeri, furcula, femora, and tibiotarsi. More than 73% of the individuals represented by these elements are juveniles. Bones from abandoned rookeries show similar patterns that can help identify old breeding sites and the species that occupied them. Radiocarbon dates completed on 13 chinstrap and Adélie penguin bones, feathers, and eggshell fragments from five abandoned rookeries suggest that occupation of these sites occurred only during warm intervals of the Little Ice Age (AD 1500-1850). These data also provide information on the paleoecology and paleobiogeography of penguins in the Antarctic Peninsula region, which help explain modern distribution patterns and demography. (Auth.)

B-53749

Melick, D., Bremmers, W., **Recently discovered breeding colony of emperor penguins *(Aptenodytes forsteri)* on the Budd Coast, Wilkes Land, East Antarctica,** *Polar record,* Oct. 1995, 31(179), p.425-426, 1 ref.

The existence of a breeding colony of emperor penguins on fast ice on the Peterson Bank was confirmed on Nov. 3, 1994. The initial sighting from an altitude of 1000 m was made during a helicopter flight involved in resupply operations from an ice-bound ship to Casey Station. A landing was made and the presence of chicks confirmed. Accurate counting of chicks was very difficult because of time constraints due to base supply operations, and the fact that the chicks were grouped in a single large creche; however, triplicate ground counts were made by two observers.

B-53750

Cruwys, E., Davis, P., **Effect of local weather conditions on the behaviour of moulting southern elephant seals, *Mirounga leonina* (L),** *Polar record,* Oct. 1995, 31(179), p.427-430, 12 refs.

The aim of this note is to document behavior observed in a pod of moulting elephant seals, Jan. 1-21, 1994, at Hannah Point, Livingston I., in relation to local weather conditions. Broad categories of behavior were recorded every 5 minutes throughout each period of observation. These included: scratching; hindflipper stretching; head movements; movement to and from the moulting site; seeking better positions within the pod; and series of wriggling and shuffling movements ('settling') in which an animal attempted to make itself more comfortable. That specific behavioral events can be related to small fluctuations in local weather conditions indicates that the seals are sensitive to such variation, and that they modify their position in order to maintain a constant body temperature.

B-53752

Hagen, W., Kattner, G., Graeve, M., **On the lipid biochemistry of polar copepods: compositional differences in the antarctic calanoids *Euchaeta antarctica* and *Euchirella rostromagna*,** *Marine biology,* Sep. 1995, 123(3), p.451-457, 47 refs.

During austral summer of 1985 different developmental stages of the antarctic copepod *Euchaeta antarctica* and females of *Euchirella rostromagna* were collected in the southeastern Weddell Sea to determine their lipid contents and compositions. For *E. antarctica* the analyses revealed a strong ontogenetic accumulation of lipids towards the older copepodids with highest lipid contents in late CV stages and adults. The most striking difference between these two species occurs in their lipid class compositions. *E. antarctica* deposited predominantly wax esters, whereas in *E. rostromagna* the major lipid class consisted of triacylglycerols, an unusual storage lipid in polar marine copepods. The potential of fatty acids and alcohols as typical trophic markers is rendered largely insignificant in the two species due to catabolic processes. (Auth. mod.)

B-53753

Ryan, S.N., **Effect of chronic heat stress on cortisol levels in the antarctic fish *Pagothenia borchgrevinki*,** *Experientia,* Aug. 1995, 51(8), p.768-774, 32 refs.

Radioimmunoassay was used to determine levels of the stress-inducible glucocorticoid cortisol, circulating in the plasma of the extremely stenothermal antarctic fish *Pagothenia borchgrevinki* at rest and after heat stress. Fish sampled immediately after capture had low cortisol levels (10.4±1.4 ng/ml, mean ±SEM) as did fish which were laboratory rested for 3 days. Sudden exposure to 5°C (48 h) resulted in a peak cortisol value after 3 h (69.9±6.8 ng/ml) whereas exposure to 8°C (6 h) resulted in a peak value after 1 h (73.5±8.0 ng/ml). At both temperatures levels remained significantly elevated ($p<0.05$) for the entire period of exposure. Increased temperature also resulted in a significant change in haemoglobin, haematocrit and mean cell haemoglobin concentration (MCHC) ($p<0.05$). Plasma lactate was significantly elevated only after exposure to 8°C ($p<0.5$). Plasma cortisol levels from *P. borchgrevinki* are reported here for the first time and show this cryopelagic antarctic species to have an unusual hormonal stress profile. (Auth.)

B-53754

Gosink, J.J., Staley, J.T., **Biodiversity of gas vacuolate bacteria from antarctic sea ice and water,** *Applied and environmental microbiology,* Sep. 1995, 61(9), p.3486-3489, 19 refs.

Psychrophilic, gas vacuolate, heterotrophic bacteria indigenous to sea ice communities in Antarctica have been isolated. Phylogenetic analysis of representative members of these bacteria shows that they belong to the alpha, beta, and gamma *Proteobacteria* and the *Flavobacteria-Cytophaga* group. This is the first report of gas vacuolate bacteria from the beta *Proteobacteria* and the *Flavobacteria-Cytophaga* groups. (Auth.)

B-53755

Barnes, D.K.A., Clarke, A., **Epibiotic communities on sublittoral macroinvertebrates at Signy Island, Antarctica,** *Marine Biological Association of the United Kingdom. Journal (JMBA),* Aug. 1995, 75(3), p.689-703, Refs. p.701-703.

The epibiotic communities on locally abundant macroinvertebrates, in particular on the brachiopod *Liothyrella uva* and the limpet *Nacella concinna,* were examined from depths between 0 and 50 m at Signy I. The percentage cover by epibionts on *Liothyrella* increased from <20% on the smallest individuals to >50% on the largest, and decreased slightly with depth. The percentage cover of *Nacella* by epibionts increased with size of individuals over an approximately similar range of values, but in contrast to *Liothyrella* increased greatly with depth. Cheilostome bryozoans and annelids of the genus *Spirorbis* formed >90% (by area) of the colonists on *Liothyrella* and 30-60% on *Nacella,* the coralline alga *Lithothamnion* and sponges making up the remainder. The bryozoans, which generally dominated the epibiotic communities, comprised complex associations of species which could be described as either generalists, host-specific epibiotic, low specificity epibiotic or locally abundant background species. (Auth. mod.)

B-53758

Budnichenko, E.V., **Changes in the age composition of dominant copepod species in the Cooperation Sea, (Antarctica) in 1977-1990,** *Oceanology,* Mar.-Apr. 1994, 34(2), p.225-231, Translated from Okeanologiia. 15 refs.

The interannual variability of the age composition and developmental periods in different water masses are given for the dominant copepod species *Calanoides acutus, Calanus propinquus,* and *Rhincalanus gigas.* The main differences of copepod age composition occur between the northern (Antarctic Circumpolar Current) and the southern (antarctic coastal current) regions. In the north copepods develop earlier than in the south. Distinctions of the species composition in waters of different types are shown. *C. acutus* and *C. propinquus* are widely distributed in three water masses, each with different age composition. (Auth. mod.)

B-53770

Timonin, V.P., **Spawning and larval krill swarm formation in More Somova** [Usloviia formirovaniia skopleniĭ nerestovogo krilia *(Euphausia superba* Dana) i ego lichinok v more Somova], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.83, In Russian.

DLC QH84.2.P45

Spawning krill concentrations as well as krill nauplii and metanauplii at depths below 500 m were recorded in the central part of the Somov Sea. Krill eggs and metanauplii were found at depths below 1000 m and in the 500-1000 m layer, respectively, in the western and southeastern parts of the sea. Considerable concentrations of spawning krill and larvae at stages from metanauplius to older calyptopis were recorded in the continental slope zone. It thus appears that krill spawn both in the open sea and in the continental slope zone.

B-53776

Savich, M.S., **Long-term dynamics of phytoplankton biomass in the Commonwealth Sea during summers 1977-1988** [Mnogoletniaia dinamika biomassy fitoplanktona v more Sodruzhestva v letniĭ vegetatsionnyĭ period 1977-1988 gg.], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.111-115, In Russian. 8 refs.

DLC QH84.2.P45

Results are analyzed of phytoplankton surveys in the area between 55 and 90°E and from 60°S to the antarctic coast. The mean long-term phytoplankton biomass in the 0-100 m layer was estimated at 695 mg/m^3 with wide variations observed in the mean annual biomass, between the minimum of 218 (Feb. 1984) and the maximum of 1137-1530 mg/m^3 (Feb. 1979, Jan. 1982). A table summarizing data on phytoplankton biomass in the 0-100 m layer in different areas along the 75th meridian, and graphs showing annual variations of some biotic and abiotic Prydz Bay ecosystem characteristics, phytoplankton and krill biomass, zooplankton abundance, water temperature and silica content are provided and correlations are discussed. The fluctuations in the Commonwealth Sea ecosystem are believed to fit into the 11-year cycle of solar activity.

B-53777

Mikaelian, A.S., Georgieva, L.V., Senichkina, L.G., **Structure of phytoplankton communities in the Atlantic sector of the Antarctic** [Struktura fitoplanktonnykh soobshchestv atlanticheskogo sektora Antarktiki], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.116-124, In Russian. 35 refs.

DLC QH84.2.P45

Techniques are described which enable adequate estimation of the abundance and biomass of all size and taxonomic phytoplankton groups and of their contribution to the structure of antarctic phytoplankton. Tabulated data show the occurrence of dominant species at 11 stations along 15°W, in the Mordvinov I. area and in the Bransfield Strait, and on their percentages of the microplankton biomass and total phytoplankton biomass; percentages of flagellates; peridoneans and diatoms of the total phytoplankton biomass and abundance; average abundance and biomass of micro-, nanno- and picoplankton in the upper mixed layer, and their percentages of the total phytoplankton abundance and biomass. The difference between the taxonomic and size distribution of phytoplankton biomass in the open areas and that in the Mordvinov I. and Bransfield Strait areas is discussed with reference to literature data.

B-53779

Mikaelian, A.S., Senichkina, L.G., Georgieva, L.S., Beliaeva, G.A., **Vertical distribution of phytoplankton biomass in the South Atlantic Ocean (Feb.-Apr.)** [Vertikal'noe raspredelenie biomassy fitoplanktona v Atlanticheskom sektore IUzhnogo okeana (Fevral'-Aprel')], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.126-133, 26 refs.

DLC QH84.2.P45

This paper is based on samples collected during the 43rd cruise of the R/V *Dmitrii Mendeleev* in 1989. Vertical profiles of phytoplankton biomass and chlorophyll *a* content were obtained from the same samples, which permitted consideration of vertical changes in the specific pigment content of the cells. The paper analyzes the vertical distribution pattern of phytoplankton using hydrological, hydrochemical, water transparency and primary production data obtained during the cruise. The results of the analysis are consistent with the generally prevalent concept that the upper pycnocline boundary is an important factor in the vertical distribution of antarctic phytoplankton in summer and autumn. The pattern of biomass changes in the uppermost mixed layer is mainly determined by the ratio between the cell growth and the turbulent mixing rates.

B-53781

Sorokin, P.IU., **Planktonic infusorians in the Atlantic sector of the southern ocean** [Planktonnye infuzorii v vodakh atlanticheskogo sektora IUzhnogo okeana], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.141-146, In Russian. 16 refs.

DLC QH84.2.P45

This paper is based on material sampled in the western Atlantic sector in Feb.-Apr. 1989. A modified technique for enumeration of microplanktonic and nannoplanktonic infusorians by epifluorescence microscopy was used to obtain data on their abundance and biomass. The spatial and vertical distributions (down to 200 m) of infusorian biomass as well as their taxonomic and size composition are considered. The data suggest that the level of planktonic infusorian development in antarctic waters is comparable to their abundance and biomass in mesotrophic and even eutrophic oceanic waters. Their biomass is only slightly lower than that of mesozooplankton, amounting to 3-9 g/m^3 during the biological summer. It thus appears that infusorians are an important component of antarctic plankton, and considering that their production rate is much higher than that of mesozooplankton, their role as an intermediate trophic link in the utilization of pico- and nannoplankton becomes increasingly evident.

B-53782

Pakhomov, E.A., **Macroplankton vertical distribution and daily migration** [Vertikal'noe raspredelenie i sutochnye migratsii antarkticheskogo makroplankton], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.146-150, In Russian. 7 refs.

DLC QH84.2.P45

Material collected in Feb.-Apr. 1989 along the section 15°W between 52° and 71°S as well as in the Mordvinov I. area and Bransfield Strait is analyzed for the vertical day- and nighttime distribution of 11 taxonomic groups of macroplankton (<10 mm) in relation to the water structure of the antarctic epipelagic zone. These studies promise insight into the mechanism of macroplankton adaptation to the antarctic biotope.

B-53783

Krakatitsa, V.V., Karpenko, G.P., Pakhomov, E.A., **Zooplankton distribution and temperature of the top 1 m layer in the Commonwealth Sea** [Osobennosti raspredeleniia zooplanktona v zavisimosti ot temperaturnoĭ stratifikatsii poverkhnostnogo metrovogo sloia vody v more Sodruzhestva], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.151-157, In Russian. 10 refs.

DLC QH84.2.P45

In Dec. 1987 and Jan.-Apr. 1988, temperature measurements were carried out in the surface 1 m layer of the Commonwealth Sea at 20, 40, 60, 80 and 100 cm of depth; plankton samples were collected at 0-10, 10-30, 30-50, 50-70 and 70-90 cm of depth. Qualitative and quantitative analyses of the samples, and their distribution in relation to water temperature distribution, are discussed and presented in tables.

B-53784

Budnichenko, E.V., **Oceanographic conditions determining**

zooplankton vertical winter structure in the Commonwealth Sea [Okeanograficheskie usloviia, opredeliaiushchie osobennosti vertikal'noĭ struktury zooplanktona v zimniĭ period v more Sodruzhestva], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.158, In Russian.

DLC QH84.2.P45

A brief report is presented of studies on zooplankton biomass, carried out in Sep.-Oct. 1983 in the Commonwealth Sea, regarding distribution, abundance and age composition of mass copepod species in relation to oceanographic conditions during winter and spring.

B-53785

Makarov, R.R., Spiridonov, V.A., **Krill life cycle and distribution** [Zhiznennyĭ tsikl i raspredelenie antarkticheskogo krilia: nekotorye itogi issledovaniĭ i problematika], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.158-168, In Russian. 68 refs.

DLC QH84.2.P45

The paper is a review of original and literature data on the biology, ecology and distribution of *Euphausia superba* published between 1936 and 1988.

B-53786

Samyshev, E.Z., **Functional structure of the distribution of *Euphausia superba* Dana** [Funktsional'naia struktura areala antarkticheskogo krilia (*Euphausia superba* Dana)], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.168-171, In Russian. 8 refs.

DLC QH84.2.P45

A deeper analysis is presented of data on krill egg and larvae distribution obtained in the Commonwealth Sea and published by the author in 1984. Included is a table with older and more recent data for the period 1978-1989, showing krill egg and larvae concentrations at 0-500 m depths in the Commonwealth Sea, from 66°S to the Antarctic Divergence, and from the Antarctic Divergence to 60°S.

B-53787

Zhuravlev, V.M., Pavlov, V.IA., **Structure and filtration process of feeding mechanisms in euphausiids** [Stroenie i fil'tratsionnye sposobnosti pishchedobyvatel'nogo apparata evfauziid], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.172-176, In Russian. 12 refs.

DLC QH84.2.P45

The physiology and morphology of feeding mechanisms in 3 groups (5 species) of euphausiids in antarctic waters are described and illustrated. An analysis of occurrence based on literature data is presented.

B-53796

Rat'kova, T.N., **Seasonal variations of the antarctic phytoplankton size composition** [Sezonnye izmeneniia razmernogo sostava antarkticheskogo fitoplanktona], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.197-203, In Russian. 18 refs.

DLC QH84.2.P45

Based on a review of pertinent literature, phytoplankton quantitative distribution in antarctic and subantarctic zones, its seasonal variations and role in the southern ocean, and its size composition in Dec. 1982 and Feb. 1983 are discussed.

B-53798

Voronina, N.M., Kolosova, E.G., **Seasonal reconstruction of the antarctic plankton community** [Sezonnye perestroĭki struktury planktonnogo soobshchestva Antarktiki], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.205-217, In Russian. 15 refs.

DLC QH84.2.P45

Results of investigations on plankton distribution and populations, carried out in the South Atlantic Ocean (55, 62°30' and 71S, and 15 and 71W) from Feb. to Apr. 1989, are discussed and shown in graphs and tables. The progress of seasonal processes in population dynamics is found to differ from species to species.

B-53799

Semel'kina, A.N., **Seasonal zooplankton variations in the Kerguelen Is. area, 1987-1988** [Sezonnye izmeneniia zooplanktona v raĭone ostrovov Kergelen v 1987-1988 gg.], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.217-220, In Russian. 8 refs.

DLC QH84.2.P45

Based on 800 samples collected during 4 surveys in the area 65-75°E, 46-52°S in Feb., Apr., July-Aug. 1987 and in Feb. 1988, this paper presents data on the taxonomic composition, biomass and vertical distribution of zooplankton. Analysis of the data shows seasonal rearrangement of the quantitative development and distribution of zooplankton determined by changes in the oceanographic conditions of the biotope and by seasonal changes in the state of its inhabitants.

B-53800

Kosobokova, K.N., Drits, A.V., Lapina, N.M., **Biochemical composition changes in antarctic copepods during summer-to-winter transitions** [Izmeneniia biokhimicheskogo sostava antarkticheskikh kopepod pri perekhode ot leta k zime], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.221-228, In Russian. 12 refs.

DLC QH84.2.P45

Based on data obtained on board the *Dmitriĭ Mendeleev*, from Feb. to Apr. 1989 in the Atlantic sector of the Antarctic (55, 62°30' and 70S; 15W), the biochemical composition of the copepods *Calanus propinquus*, *Calanoides acutus* and *Rhincalanus gigas* were determined. Tabulated results are presented.

B-53801

Borodkin, S.O., Korzhikova, L.I., **Changes in total phosphorus component composition in antarctic copepods linked to ecological factors** [Izmenenie komponentnogo sostava obshchego fosfora antarkticheskikh kopepod v zavisimosti ot ekologicheskikh faktorov], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.228-230, In Russian. 4 refs.

DLC QH84.2.P45

Based on data collected on board the *Dmitriĭ Mendeleev* from Feb. to Apr. 1989 in the Atlantic sector of the Antarctic, an assessment was made of total phosphorus concentration, and its component composition, in antarctic copepods *Calanoides acutus, Calanus propinquus* and *Rhincalanus gigas* in different ecological conditions. Tabulated results are presented.

B-53802

Sorokin, IU.I., Mamaeva, T.I., **Phytoplankton primary productivity in antarctic waters** [Pervichnaia produktsiia fitoplanktona v vodakh Antarktiki], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the

southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.231-240, In Russian. 28 refs.
DLC QH84.2.P45

Phytoplankton primary productivity measurements, carried out in the Scotia and Weddell seas and in the Bransfield Strait in Feb.-Apr. 1989, are presented and discussed with reference to literature data. Factors limiting the level of primary productivity in antarctic waters are considered.

B-53803

Domanov, M.M., **Annual cycle variations of coastal primary productivity and chlorophyll in Admiralty Bay** [Godovoĭ tsikl izmeneniia pribrezhnoĭ produktsii i khlorofilla v antarkticheskom raĭone (o-v King Dzhordzh)], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.240-243, In Russian. 14 refs.
DLC QH84.2.P45

Measurements of year-round variations in primary productivity and chlorophyll *a*, carried out in Admiralty Bay at 450 m depth and at a distance of 1.5 miles from the coast, from Feb. 1988 to Feb. 1989, are discussed. Results, including diatom cell numbers and assimilation rate dependence on temperature, are shown in graphs.

B-53804

Sorokin, IU.I., Sorokin, P.IU., **Bacterioplankton biomass and production in the Antarctic** [Biomassa i produktsiia bakterioplanktona Antarktiki], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.243-249, In Russian. 13 refs.
DLC QH84.2.P45

A modified radiocarbon method used to measure bacterial production is described. Data are presented on the abundance, mean cell volume, biomass, production and vertical distribution of bacterioplankton down to 4000 m in the western part of the Atlantic sector of the Antarctic, based on material collected along 15°W in Feb.-Apr. 1989 on board the *Dmitriĭ Mendeleev.*

B-53805

Drits, A.V., Pasternak, A.F., **Feeding of dominant species of antarctic zooplankton in summer** [Pitanie massovykh vidov antarkticheskogo zooplanktona v letniĭ period], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.250-259, In Russian. 22 refs.
DLC QH84.2.P45

This paper is based on material collected at stations along 15°W off Mordvinov I. and in the Bransfield Strait in Feb.-Apr. 1989. Data are presented on the gut contents, circadian feeding rhythms and gut evacuation rates in 3 herbivorous copepod species *(Rhincalanus gigas, Calanoides acutus* and *Calanus propinquus),* krill *(Euphausia superba)* and salp *(Salpa thompsoni).* Daily rations and phytoplankton grazing rates are estimated. The results suggest that the role of copepods in the utilization of primary organic matter is insignificant throughout the vegetation period. Krill swarms may affect phytoplankton during short bloom periods; salp concentrations consume a significant portion of primary production irrespective of the phase of phytoplankton development.

B-53807

Bevan, R.M., Woakes, A.J., Butler, P.J., Boyd, I.L., **Use of heart rate to estimate oxygen consumption of free-ranging black-browed albatrosses *Diomedea melanophrys*,** *Journal of experimental biology,* Aug. 1994, Vol.193, p.119-137, Refs. p.135-137.
DLC QH301.J68

Heart rates (fH) and rates of oxygen consumption (V_{O_2}) were measured in eight black-browed albatrosses *(Diomedea melanophrys)* when walking on a treadmill, with the aim of using fH to predict V_{O_2} in free-ranging albatrosses. Estimates of metabolic rate derived from fH, DLW and respirometry did not differ (ANOVA; P=0.04), primarily because of the variance between individual birds. There was also no significant difference between the estimates obtained from the different equations used to calculate energy expenditure from the DLW technique (ANOVA; P=0.95). Mean estimates of V_{O_2} from fH under active and inactive conditions differed from measured values of V_{O_2} by -5.9% and -1.7% respectively. In addition, the estimates of V_{O_2} from fH at different walking speeds did not differ significantly from the measured values. It appears that, in the black-browed albatross, fH is as good a predictor of the mean metabolic rate of free-ranging birds as DLW or time-energy budgets combined with either respirometry or DLW. However, the method should be applied to as many individuals and as many instances of a particular behavior as possible. The heart rate technique offers potential for much more detailed analyses of the daily energy budgets of these birds, and over much longer periods, than has previously been possible. (Auth. mod.)

B-53811

Lorentsen, S.H., Røv, N., **Incubation and brooding performance of the antarctic petrel *Thalassoica antarctica* at Svarthamaren, Dronning Maud Land,** *Ibis,* July 1995, 137(3), p.345-351, 29 refs.

Antarctic petrel *Thalassoica antarctica* incubation and brooding effort was studied at Svarthamaren, Queen Maud Land during the austral summer of 1991-92. The duration of incubation and brooding shifts as well as the daily weight loss (absolute and proportionate) were comparable with those of other similar-sized procellariform species. Males spent more time incubating and brooding than did females, suggesting higher female energy stress due to egg laying. Incubating birds which were below average weight were likely to desert the nests before their mates returned from feeding trips. Both males and females lost approximately one-fifth of their body-weight during their first incubation shifts. Nevertheless, they increased their initial weights from egg laying to hatching and had their highest initial weights when they returned to start the shift during which the egg hatched. No factors related to adult body-weight explained the duration of the incubation shifts. (Auth. mod.)

B-53817

Skóra, K.E., ***Acanthodraco dewitti* gen. et sp. n. (Pisces, Bathydraconidae) from Admiralty Bay (King George Island, South Shetland Islands, Antarctica),** *Archive of fishery and marine research,* 1995, 42(3), p.283-289, With German, Spanish, and French summaries. 15 refs.

A new bathydraconid fish *Acanthodraco dewitti* gen. et sp. n. (holotype 169 mm TL, Admiralty Bay, King George I., depth 253-255 m) is described. The new genus and species belong to the subfamily *Gymnodraconinae,* and differs from the related genus *Psilodraco* by having two lateral lines on the body, a number of additional spines on the opercular bones and a relatively short pectoral fin.

B-53819

Davison, W., Franklin, C.E., Carey, P.W., **Oxygen uptake in the antarctic teleost *Pagothenia borchgrevinki.* Limitations imposed by X-cell gill disease,** *Fish physiology and biochemistry,* 1990, 8(1), p.69-77, Refs. p.76-77.

Fish in a population of *Pagothenia borchgrevinki* in McMurdo Sound are affected by a gill disease (X-cell disease) which causes tissue hyperplasia that results in a decreased gill surface area and an increased water/blood diffusion distance. *P. borchgrevinki* acquires 95% of its oxygen via the gills, but damage to the gills by X-cell disease did not affect this function. There was no compensatory shift to cutaneous respiration. X-cell disease reduced the ability for oxygen uptake at low ambient P_{O_2} and the decreased uptake was related to the extent of the disease. V_{O_2} max was greatly reduced in X-cell affected fish and substantially reduced their aerobic potential. This effect may impair the ability of diseased fish to catch prey and avoid predators. (Auth.)

B-53820

Broady, P.A., Smith, R., **Initial report on an investigation of the dispersal of algae in southern Victoria Land, 1990/91,** *BIOTAS newsletter,* 1991, No.6, p.5-7.

During the 1990-91 summer, the University of Canterbury expedition tested several techniques for the detection of airborne algae and for the transport of algae to Antarctica by human activities. None of the methods for direct sampling of airborne algae detected many propagules, although the indirect approach of examining algae deposited on snowdrifts suggests that numerous propagules are dispersed by wind. The human vector was shown to be effective in bringing propagules into the antarctic region, especially on the surfaces of fresh vegetables. Methods used, preliminary results and discussion are elaborated.

B-53821

Broady, P.A., **New Zealand proposal for ecological and taxonomic studies of terrestrial algae,** *BIOTAS newsletter,* 1992, No.7, p.8-9, 13 refs.

Algae are the most widespread and diverse photosynthetic life forms in the Ross Sea regions of Antarctica as well as being the biomass dominants. They occur in lakes, ponds and streams, on the surface of flushed soils, within dry desert soils, as crusts over flushed rock surfaces and within the matrices of certain rock types. Previous investigations have shown significant differences in floristic composition of algal communities in different habitats and at different locations. The major component of the proposed program will be a detailed ecological and taxonomic survey of algae at Granite Harbour, Victoria Land.

B-53825

Ward, P., Shreeve, R.S., **Egg production in three species of antarctic calanoid copepods during an austral summer,** *Deep-sea research, Part I,* May 1995, 42(5), p.721-735, 31 refs.

Average daily egg production was highest for the subantarctic *C. simillimus.* This species normally spawns in the spring in the central part of its geographical range but was apparently delayed by the colder waters found around South Georgia. For *R. gigas* and *C. acutus* egg production averaged 8.9 and 6.0 eggs/female/d, respectively. The former species appeared to be undergoing protracted recruitment while the population of the latter was preparing to overwinter. Considerable interstation variability existed, although no relationships were apparent between surface chlorophyll concentrations and either egg production in experiments or in the numbers of eggs recovered by the nets. Clutch size did not differ significantly among the three species, although the maximum clutch size recorded for *R. gigas* was almost twice that of *C. simillimus.* Samples taken from the Bellingshausen Sea during the latter part of 1992 indicated that recruitment of *R. gigas* and *C. acutus* commenced in early December in this region when adult females were concentrated in the surface 250 m and a diatom bloom was developing. (Auth. mod.)

B-53836

Voytek, M.A., Ward, B.B., **Detection of ammonium-oxidizing bacteria of the beta-subclass of the class *Proteobacteria* in aquatic samples with the PCR,** *Applied and environmental microbiology,* Apr. 1995, 61(4), p.1444-1450, 42 refs.

Polymerase chain reaction (PCR) was used as the basis for the development of a sensitive and specific assay for the detection of ammonium-oxidizing bacteria belonging to the beta-subclass of the class *Proteobacteria.* PCR primers were selected on the basis of nucleic acid sequence data available for seven species of nitrifiers in this subclass. The specificity of the ammonium oxidizer primers was evaluated by testing known strains of nitrifiers, several stereotyped environmental nitrifier isolates, and other members of the *Proteobacteria,* including four very closely related, nonnitrifying species (as determined by rRNA sequence analysis). DNA extracts from 19 bacterioplankton samples collected from Lake Bonney, Antarctica, and the Southern California Bight were assayed for the presence of ammonium oxidizers. By using a two-stage amplification procedure, ammonium oxidizers were detected in samples collected from both sites. Chemical data collected simultaneously support the occurrence of nitrification and the presence of nitrifiers. (Auth. mod.)

B-53837

Arnould, J.P.Y., Boyd, I.L., **Temporal patterns of milk production in antarctic fur seals *(Arctocephalus gazella)*,** *Journal of zoology,* Sep. 1995, 237(1), p.1-12, 26 refs.

The timing of milk production in antarctic fur seals was studied at Bird I. Like all lactating otariid seals, fur seal females alternate between short nursing periods ashore and regular foraging trips to sea. Females do not necessarily return to the colony with full mammae, which indicates that mammary volume capacity is unlikely to limit foraging trip duration. Upon arrival at the colony, milk fat and protein content were positively correlated to the time spent at sea. A similar trend was observed in the milk produced on land. The rate of milk energy production was much lower at sea than on land. The rate of milk energy production during the foraging trip was negatively correlated to the time spent at sea, whereas the rate of milk energy production on land was positively correlated to the duration of the preceding foraging trip. The total amount of milk energy delivered to the pup during each two-day nursing period was positively correlated to the duration of the previous foraging trip. (Auth. mod.)

B-53838

Croxall, J.P., Hall, A.J., Hill, H.J., North, A.W., Rodhouse, P.G., **Food and feeding ecology of the white-chinned petrel *Procellaria aequinoctialis* at South Georgia,** *Journal of zoology,* Sep. 1995, 237(1), p.133-150, Refs. p.148-149.

The diet of the white-chinned petrel at Bird I. was studied during chick-rearing in 1986 by quantitative analysis (by weight, frequency of occurrence and number of individuals) of regurgitated or lavaged adult stomach contents. Antarctic krill comprised over 90% of prey items and formed 47% of the diet by weight; fish and squid occurred in 67% and 35% of samples and formed 33% and 19% of the diet by weight, respectively. Decapods, amphipods and salps occurred in a few samples. The fish were mainly lanternfish (Myctophidae) of eight species (chiefly *Electrona* and *Gymnoscopelus,* forming 80% by number and 52% by mass of fish prey) and the nototheniid *Patagonotothen guntheri* (14% by number and 35% by mass). Of squid taken, the ommastrephid *Martialia hyadesi* comprised 57% by number and 52% by mass and the gonatid *Gonatus antarcticus* 14% by number and 42% by mass. These dietary data confirm the white-chinned petrel as the most important avian consumer of fish and squid at South Georgia and the third most important consumer of krill. (Auth. mod.)

B-53839

Pugh, P.J.A., **Air-breathing littoral mites of sub-Antarctic South Georgia,** *Journal of zoology,* Aug. 1995, 236(4), p.649-666, Refs. p.664-666.

Nine species of littoral air-breathing Acari were collected at Husvik Harbour, South Georgia, comprising three *Parasitiphis* (Rhodacaridae), one *Nanorchestes* (Nanorchestidae), two *Halozetes* (Podacaridae) and three *Hyadesia* (Hyadesidae). All of the adaptive physiological and structural features observed in these mites are paralleled in related European littoral species. Although the predatory *Parasitiphis* spp. may cohabit in upper littoral crevices and feed on similar prey, they forage among different habitats. By contrast, *Halozetes* and *Hyadesia* spp. frequently occur together and occupy very similar niches, but competition does not appear to be significant and cohabitation may be a mutually advantageous strategy to prevent dislodgement by wave action. (Auth.)

B-53853

Murray, A.W.A., Watkins, J.L., Bone, D.G., **Biological acoustic survey in the marginal ice-edge zone of the Bellingshausen Sea,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1159-1175, Refs. p.1174-1176.

An acoustic survey at 38 kHz was carried out from R.R.S. *Discovery* in the Bellingshausen Sea from Nov. 23 to Dec. 7, 1992. A total of 285 targets were identified and described from the chart record of the echo sounder. Mean volume backscattering strength data were collected using an echo integration system. These data are used to describe the spatial and temporal variability of krill *(Euphausia superba)* distribution and biomass in the marginal ice-edge zone. Krill biomass density varied from a mean of 42 g/m^2 during the first survey phase to 20 g/m^2 on the second survey phase. The number of small swarms detected during the second phase was greater than during the first phase. On this first survey a large swarm (2.8 km in extent) had a potential biomass of 3.7×10^4 tonnes. Calculations are presented to show the potential impact of krill on the flux of carbon in the area of the survey. (Auth.)

B-53854

Boyd, P.W., Robinson, C., Savidge, G., Williams, P.J.B., **Water**

column and sea-ice primary production during Austral spring in the Bellingshausen Sea, *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1177-1200, Refs. p.1197-1200.

The findings of a cruise to study the phytoplankton bloom dynamics associated with the marginal ice zone (MIZ) in the Bellingshausen Sea during austral spring (Nov.-Dec.) 1992 are reported. Biomass and rate process measurements were carried out at stations located in the ice, ice edge and open water along the 85°W meridian in order to establish the productivity of the microalgae associated with sea-ice and in the water column. In addition, a series of transects along 85°W from sea-ice to open water conditions enabled an assessment of the development of phytoplankton populations. Low phytoplankton biomass and production were noted at ice-covered and ice-edge stations and in the open water close to the ice edge. Observations from the transects indicated no development of a classical ice edge bloom despite evidence that sea-ice had retreated more than 100 km during the study period. Survey data along the 85°W line revealed a region of high chlorophyll, centered on 67.5°S, which was initially observed during brash ice. Water column primary production (^{14}C) in this high chlorophyll region was ca. 0.8 g C/m^2/day, more than 8 times higher than noted in the MIZ. Phytoplankton photosynthetic characteristics within this region indicated that cells were adapted to a low light regime. (Auth. mod.)

B-53855

Savidge, G., Harbour, D., Gilpin, L.C., Boyd, P.W., **Phytoplankton distributions and production in the Bellingshausen Sea, Austral spring 1992,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1201-1224, Refs. p.1222-1224.

Samples were taken from the open water region of the Bellingshausen Sea directly north of the ice-edge zone between 65.5 and 69.0°S, 83.5 and 88.0°W by R.R.S. *Discovery* between Nov. 23 and Dec. 8, 1992 for estimates of size-fractionated chlorophyll *a* concentrations and primary production and also for data on phytoplankton taxonomic distributions. The size-fractions (SF) considered were >18 µm and 0.2-2 µm. The data confirmed the presence of a high chlorophyll zone (HCZ) immediately south of the surface boundary of the Southern Polar Front and also the absence of a classical stability induced ice-edge bloom, as inferred from a concurrent hydrographic survey. Chlorophyll *a* concentrations both within and without the HCZ were dominated by the >18 µm SF, with this fraction consistently comprising >75% of the total chlorophyll biomass within the HCZ. Although maximal productivity also was associated with the >18µm SF, at the majority of locations its relative contribution to the total was generally less than for the comparable chlorophyll *a* samples, indicating a reduced photosynthetic efficiency for this SF compared to the smaller SFs. To the north of the HCZ primary production was approximately equal among the three SFs. (Auth. mod.)

B-53858

Burkill, P.H., Edwards, E.S., Sleigh, M.A., **Microzooplankton and their role in controlling phytoplankton growth in the marginal ice zone of the Bellingshausen Sea,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1277-1290, 24 refs.

Microzooplankton and their herbivorous activity were quantified on a transect in the Bellingshausen Sea. The transect was worked during the austral spring period of Nov.-Dec. 1992, with stations in pack-ice, ice-edge, and open waters of the marginal ice zone (MIZ). Microzooplankton varied in their abundance in the surface mixed layer within the MIZ transect by more than an order of magnitude. In the waters beneath the pack-ice, microzooplankton concentrations were low (ca. 850 organisms/l); they increased at the ice-edge station (2110 organisms/l) and reached a maximum (ca. 17,000 organisms/l) at the open water situated ca. 200 km north of the ice-edge. The community was dominated by Protozoa, which contributed >97% of the numerical abundance of microzooplankton and >89% of the standing stocks. Protozoan communities were dominated by naked oligotrich ciliates and heterotrophic dinoflagellates. Microzooplankton biomass in the mixed layer of the MIZ varied between 0.2 and 54 µgC/l, with the minimum situated at depth under the ice and maximum in open surface waters, respectively. Microzooplankton biomass was strongly correlated to ambient phytoplankton concentrations and averaged 24% of their biomass. (Auth. mod.)

B-53859

Atkinson, A., Shreeve, R.S., **Response of the copepod community to a spring bloom in the Bellingshausen Sea,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1291-1311, Refs. p.1309-1311.

During austral spring 1992, R.R.S. *James Clark Ross* worked a 5 station transect in the Bellingshausen Sea. The transect spanned unproductive waters under solid pack ice to an open-water bloom in the north, three weeks later. This paper addresses the ontogenetic development of the copepod community, and from grazing experiments on females of 5 species investigates their trophic response to a spring bloom. Copepods dominated the mesozooplankton in both numbers and biomass. Their mean biomass in the top 600 m was low (0.85-1.5 mg drymass/m^3). Despite the cold temperatures, the mass-specific feeding rates of the 5 species measured were broadly comparable to summer values from more northern regions of the southern ocean. However, the estimated grazing impact of the copepod community at all the stations was negligible, rising to a maximum of only 8.4% of daily primary production at the most northerly bloom station. These low values result from the very low numbers of copepods in the epipelagic, particularly under the ice. Of the copepods measured, grazing was mainly by the adult female population of *Oithona* spp. before the bloom, and appeared to be mainly by *Oithona* spp. and *C. acutus* during the bloom. (Auth. mod.)

B-53867

Skerratt, J.H., Nichols, P.D., McMeekin, T.A., Burton, H., **Seasonal and inter-annual changes in planktonic biomass and community structure in eastern Antarctica using signature lipids,** *Marine chemistry,* Oct. 1995, 51(2), p.93-113, 55 refs.

The total lipid, fatty acid, sterol and pigment composition of water column particulates collected near the Australian Davis Station were analyzed over five summer seasons (1988-93). Maximum lipid concentrations usually occurred in samples collected in Dec. and Jan. and corresponded with increased algal biomass. Polar lipids were the dominant lipid class. Both lipid profiles and microscopic observations showed significant variation in biomass and community structure in the water column both intra- and interannually. Very high polyunsaturated fatty acid and total lipid concentrations were measured during diatom blooms in the area. Bacterial markers increased in concentration after the summer algal blooms in each year. Samples collected from the fjords contained greater biomass and diversity in algal and bacterial markers than samples from coastal sites. Signature lipids for the prymnesiophyte *Phaeocystis* sp., thought to be seasonally abundant in antarctic waters, were identified in field samples over the five summer seasons studied. Based on the lipid profiles, the overall abundance of *Phaeocystis* sp. throughout the five summer seasons was sporadic and in most summers the abundance was low; these findings suggest *Phaeocystis* sp. is not always a major alga in this coastal region of Antarctica. (Auth. mod.)

B-53875

Innamorati, M., Lazzara, L., Mori, G., Nuccio, C., Saggiomo, V., **Phytoplankton ecology,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.141-252, 7 refs.

Results of investigations carried out in the Ross Sea and the South Pacific Ocean, concerning nutrient concentrations, total and fractionated pigment concentrations, primary productivity, depth profiles of temperature, salinity, density, fluorescence and MIE scattering, and temporal and vertical variations of chlorophyll and nutrients are presented in tables and charts. Instruments used in the study are described.

B-53876

Magazzú, G., Decembrini, F., **Primary production in the southern ocean,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.255-309, 15 refs.

The objectives of the 1989-1990 study carried out along the transect extending south from 60°S to the Ross Sea were as follows: to estimate the rate of ^{14}C assimilation, to define the autotrophic picoplankton incidence in the antarctic marine ecosystem, and to determine its role in the trophic chain as an alternative to the classic food web (diatoms, krill and cetaceans). Results of all the measurements are presented in tables; the vertical trend of ^{14}C and the production percentage for each fractional category of the autotrophic plankton are illustrated in graphs.

B-53877

Balduzzi, A., Barbieri, M., Bavestrello, G., Sará, M., **Check-list of antarctic and circumantarctic Demospongiae,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.313-335, Refs. p.313-315.

In order to define a comprehensive picture of the distribution of antarctic and south-austral Demospongiae, and to get from it some faunistic, biogeographic and evolutionary considerations about the origin and composition of antarctic sponge fauna, these data were arranged in a database file on a personal computer. A list of 768 species collected from the considered area was obtained from this analysis. Among these species, 294 are reported from the antarctic area (201 from the continental coasts and 195 from the subantarctic islands), and 269 from New Zealand (Auckland Is. included). In order to organize the antarctic and subantarctic records, both the continental coast and the insular belt were divided into nine sectors of about 40° longitudinal range each. The distribution of the antarctic and circumantarctic demosponge species is summarized and tabulated.

B-53878

Balduzzi, A., Cattaneo-Vietti, R., **Littoral benthic communities of Terra Nova Bay: sampling data report,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.337-342, 3 refs.

A study of the composition and distribution of hard and soft bottom benthic communities in Terra Nova Bay, with particular attention to zoological taxa such as Porifera, Hydrozoa, Mollusca (partim), Annelida (partim) and Bryozoa (partim) is reported. The sampling activities were restricted to the area near the Italian base. A file-card was prepared for each sample, noting date, station coordinates (GPS), locality, depth, sampling method, type of substrate, the main collected organisms or the "guide" species and, when occurring, the presence of biodetritus or eventual subdivisions of the sample for special purposes. A table summarizes the essential data for each sample, which are arranged according to sampling method, geographical location (from North to South) and depth.

B-53879

Bavestrello, G., Cattaneo-Vietti, R., Pansini, M., **Eco-physiological and biochemical approach to the study of antarctic sponges,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.343-345, 11 refs.

Ten species of sponges collected in Terra Nova Bay during the 2nd oceanographic campaign in 1989-1990 were analyzed to determine their chlorophyll content; tabulated results are presented.

B-53880

Gambi, M.C., Mazzella, L., **Second Italian Oceanographic Expedition in the Ross Sea, Antarctica: preliminary report on the quantitative and functional studies of benthic communities of Terra Nova Bay,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.349-367, Refs. p.353-354.

Sampling of benthic organism in Terra Nova Bay is reported; the ecology of individual taxa and their potential trophic role within the system are defined. Data on algal biomass and animal density and diversity are presented in tables.

B-53881

Cormaci, M., Furnari, G., Scammacca, B., Casazza, G., **Phytobenthos sampling in Terra Nova Bay (Ross Sea, Antarctica): 1989-90 campaign,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.371-376, 14 refs.

An investigation of the specific composition of benthic phytocoenoses and the structure and distribution of macroalgal communities in Terra Nova Bay during the summer of 1989-1990 is reported. The floristic composition of the samples and a floristic list of species obtained during a previous expedition (1987-1988) are discussed. Tabulated data on phytobenthos samples from various localities are presented.

B-53882

Relini, G., Amato, E., **Italian Antarctic Research Programme: environmental impact assessment at sea: fouling experiment—second note,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.379-391, 6 refs.

In order to study fouling, in particular macrofouling in the waters of Terra Nova Bay during a campaign in 1986-87, two stations were immersed to a depth of 15 m. In the following campaign (1987-88) the panels of the first two stations were replaced and four stations were added, as shown in figures. No significant difference was found between the settlement on plastic-net protected panels and the unprotected ones. From this the authors conclude that poor settlement is not determined by predation or grazing.

B-53883

Alabiso, G., et al, **Marine corrosion of metal alloys of wide technological use in extreme environmental conditions,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.395-409.

Metal exposure tests were carried out during the 1989-1990 Italian expedition to evaluate the antarctic marine environment's corrosivity on a series of metal alloys. A structure equipped with an automatic system for recording the electrochemical parameters was immersed in the sea containing 120 metallic samples which will be recovered during the expedition of 1990-91. The examination of the results should give a statistical evaluation of the corrosion behavior in antarctic conditions of the following alloys: stainless steels AlSl 304, AlSl 316, 254 SMO, brass, copper, cupronickel 70/30, aluminium trade and peraluman alloy. Electrochemical parameters such as corrosion potentials and galvanic currents should be supported by the biofilm characterization and by the singling out of the microfouling growth modalities in the different exposure and temperature conditions.

B-53887

Bruni, V., Maugeri, T.L., Acosta Pomar, L., Grasso, S., Moio, L., **Preliminary data on marine microflora in Terra Nova Bay (Antarctica),** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.87-104, Refs. p.94-95.

After a brief review of previous studies on the role microorganisms play in marine ecosystems, especially in the Antarctic, an investigation carried out in Terra Nova Bay on the spatial distribution of microorganisms and some of the heterotrophic bacterial activities and their environment is reported. A summary of the activities, methods and instruments used, and preliminary results are given. The data are presented in tables and graphs. It is concluded that the antarctic microflora in the area studied is not very different from that found in the oceans at lower latitudes.

B-53888
Magazzú, G., Decembrini, F., **Primary production and picoplankton C assimilation in the Ross Sea (Antarctica),** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.107-157, 12 refs.

The objectives of the Italian expedition of 1987-88 to the Ross Sea were the following: to estimate the rate of assimilation both along the coast and offshore; and to define the autotrophic picoplankton incidence (if present) in the antarctic marine ecosystem and its role in the trophic chain as an alternative to the traditionally accepted one dominated by diatoms, krill and cetaceans. The results of all measurements are presented in tables. The vertical trend of ^{14}C, and the production percentages for each fractional category of the autotrophic plankton, are illustrated in graphs.

B-53889
Innamorati, M., Mori, G., Lazzara, L., Nuccio, C., Lici, M., Vanucci, S., **Ecology of phytoplankton,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.161-238, 10 refs.

The main objective of the authors' research in the Ross Sea was to obtain a first estimate of the phytoplankton biomass and to define the spatial distribution of the planktonic species with regard to the main environmental factors. Besides nutrients, attention has been focused on the underwater light field, in order to define the relationships among the visible irradiance, its extinction and the particulate matter, including phytoplankton. All results are presented in tables and graphs.

B-53890
Fonda Umani, S., Monti, M., **Microzooplanktonic populations in Terranova Bay (Ross Sea),** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.241-254, 18 refs.

This research aimed to determine the taxonomic composition and the spatial distribution of the microzooplanktonic populations in Terra Nova Bay. The focus of the study was to produce a systematic description of the most-represented organisms and to assess the microzooplanktonic biomass distribution as related to the vegetable biomass and to mesozooplanktonic distributions. Samples were collected at 12 stations from Jan. 9 to Feb. 2, 1988. Data in tables and figures show that at 5 stations maximum values are recorded in surface waters; at 3 stations, highest values were recorded at intermediate depths and at other stations, at the bottom.

B-53891
Guglielmo, L., Costanzo, G., Manganaro, A., Zagami, G., **Spatial and vertical distribution of zooplanktonic communities in the Terranova Bay (Ross Sea),** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.257-398, 7 refs.

During the 1987-88 Italian Antarctic Oceanographic Expedition, the following was pursued: taxonomic studies on zooplankton and micronekton; a model of spatial and vertical distribution of each species; relationships between the abundance and the biomass of zooplankton and the variability of hydrological parameters and primary production; improved knowledge of the diel migrations of each species; and analysis of the community structure in the trophic web. Results are presented in tables and graphs.

B-53892
Della Croce, N., Zunini Sertorio, T., **"Antarctic 1987/1988" National Program: Oceanographic Campaign 1988 Sorting Center,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.401-404.

Within the framework of the "Antarctic 1987-1988" National Program, 314 samples of zooplankton were collected at different depths and 35 stations in the Ross Sea and were sorted out at two different locations in Italy. The sorting centers, the distribution of the material and the methods and instruments used in the analysis are described.

B-53893
Di Geronimo, I., Rosso, A., **First Italian Oceanographic Expedition in the Ross Sea, Antarctica. Benthos: a preliminary report,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.407-421, Refs. p.413-414.

During the First Italian Oceanographic Expedition to Terra Nova Bay a large number of grab and dredge samples was taken to study benthic marine communities. By televising with "Pluto", a remote operated vehicle, some observations were carried out to 200 m depth. Preliminary results show a complex variety of algal and animal facies in a general benthic assemblage dominated by sessile organisms. A preliminary bionomic scheme of Terra Nova Bay benthos, and a possible facies succession in relation to increasing depth and mud quantity, are proposed. (Auth.)

B-53894
Rosso, A., **Bryozoan community of IB3 Station (Ross Sea, Antarctica),** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.423-438, Refs. p.428-430.

The Bryozoan community from Station IB3 of the First Italian Oceanographic Antarctic Expedition (1987-88) was studied; altogether 38 genera and 50 species have been found (3 Cyclostomata, 27 Cheilostomata Anasca and 20 C. Ascophora). The studied community is characterized by the clear dominance of two species, *Flustra vulgaris* and *Himantozoum antarcticum,* and by the prevalence of erect, flexible, and subordinately rigid forms over Membraniporiforms and Celleporiforms. Some data on the sexual maturity and the presence of embryos, ancestrulae and juvenile colonies presence are given. The great abundance of rooted species and the variability of rootlets as an adaptation to diverse substrata are pointed out. (Auth. mod.)

B-53895
Violanti, D., **Preliminary data on living foraminifera from Terranova Bay, Antarctica. (Sample IB3),** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.439-442, 24 refs.

Foraminifera of sample IB3 from Terra Nova Bay (1987-88) are briefly analyzed. Living specimens of *Cibicides lobatulus, Rosalina globularis* and Miliolids are rather common. Empty shells are abundant. Planktonic foraminifera are represented by *Neogloboquadrina pachyderma.* Benthic species are dominant (P/P + B=20-30%). Very abundant calcareous tests, predominantly of sessile forms, testify to a bottom depth above the Calcite Compensation Depth. Cosmopolitan species are common; some species restricted to antarctic waters *(Astrononion antarcticum)* or distributed in austral oceans or high latitudes *(Florilus* cf. *Punctulatus, Cribrostomoides jeggreysii)* are present as well. (Auth.)

B-53896
Cormaci, M., Furnari, G., Scammacca, B., **Data report on seaweeds from Terra Nova Bay (Ross Sea) Antarctic,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.445-453, Refs. p.451-453.

During the antarctic expedition of 1987-88 to Terra Nova Bay, research was carried out on the phytobenthic communities. In particular, the distribution of benthic vegetal communities along the coast between Cape Washington and Inexpressible I., their specific composition as well as their position within the biocoenotic unities, were investigated.

B-53897

Vacchi, M., **Necton and antarctic fishing resources. First results of the 1987/88 expedition,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.457-467, Ref. p.459-460.

An Italian program started in 1987-1988, aiming to acquire new data on the biology and population dynamics of some antarctic species suitable for commercial exploitation, is described. From some sampling carried out in Terra Nova Bay, catches of 10 species from 3 families are reported, the most abundant species being *Pagothenia bernacchii* followed by the icefish *Chionodraco hamatus.* A flow chart of the objectives of the program and tabulated data on the catches are presented.

B-53898

Parisi, E., Vacchi, M., Sibour, M., Civera, T., Pellegrino, C., **Electrophoretic patterns of sarcoplasmatic proteins of some antarctic fish,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.469-475.

Fish samples belonging to the families Bathydraconidae, Channichthydae and Notothenidae, collected in Terra Nova Bay during Jan.-Feb. 1988, were analyzed for their sarcoplasmatic protein pattern with the object of reaching an exact species identification within the families and for taxonomic comprehension. Materials and methods used are described, and the results are illustrated in figures.

B-53900

Italy, National Scientific Commission for Antarctica, **Oceanographic Campaign 1987-88: Data report, Part II, physical, chemical and biological oceanography,** Genoa, 1990, 277p., Refs. passim. For individual papers see B-53902 through B-53908, J-53901 and J-53909.

This volume, the second of two parts, contains a collection of 9 reports based on the Italian research carried out during the Oceanographic Campaign of 1987-1988. The studies covered the hard bottom zoobenthos, with particular attention paid to the distribution of living foraminifera in Terra Nova Bay and to phytoplankton biomass, its spatial distribution and its species composition, with the aim to assess any possible damage to the environment caused by man. The data are presented in numerous tables and graphs.

B-53902

Zunini Sertorio, T., Salemi Picone, P., Bernat, P., Cattini, E., Ossola, C., **Copepods collected in sixteen stations during the Italian Antarctic Expedition 1987-1988,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part II, physical, chemical and biological oceanography, Genoa, 1990, p.67-125, Refs. p.69-70.

This report deals with the composition, abundance, distribution, morphology and biomass of copepods collected at 16 stations, of which one is located in circumpolar waters and the rest in the Ross Sea. A list of species caught is presented; the rest of the data is presented in tables and figures.

B-53903

Carli, A., Mariottini, G.L., Pane, L., **Contribution to the study of copepods collected in Terranova Bay (Ross Sea),** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part II, physical, chemical and biological oceanography, Genoa, 1990, p.129-159, 15 refs.

A study of taxonomy, distribution and sex ratio of several collected Copepoda species, in order to increase the knowledge of planktonic secondary production in Terra Nova Bay, is discussed. Results are presented in tables and graphs, including hydrographic data obtained at different sampling points.

B-53904

Carli, A., Pane, L., **Contribution to the study of larval crustacean decapods in the Terranova Bay (Ross Sea): *Notocrangon antarcticus* (Pfeffer, 1887),** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part II, physical, chemical and biological oceanography, Genoa, 1990, p.161-167, 7 refs.

Study of larval crustacean decapods in Terra Nova Bay, covering taxonomic characterization, larval density distribution, and occurrence at different developmental stages, is reported. The larval crustacean decapods found in the area belong almost exclusively to the species *Notocrangon antarcticus,* and the high density of the specimen found near the Drygalski Glacier leads to the conclusion that conditions for the development of this species are very favorable in the area.

B-53905

McKenzie, K.G., Benassi, G., Naldi, M., Ferrari, I., Menozzi, P., **Report on planktic Ostracoda from the Ross Sea, Antarctica,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part II, physical, chemical and biological oceanography, Genoa, 1990, p.171-229, Refs. p.175-177.

This report presents the following: a review of previous work, with special attention to the taxonomy and biogeography of planktic antarctic Ostracoda; a description of the species found during Jan.-Feb. 1988 in the Ross Sea; distribution in space of the density of total number of Ostracoda and of the dominant species; and future research perspectives and suggestions for field work (Dec. 1989-Feb. 1990) in the Ross Sea.

B-53906

Violanti, D., **Distribution of living benthic foraminifera from Terranova Bay (Antarctica): preliminary data,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part II, physical, chemical and biological oceanography, Genoa, 1990, p.233-237, Refs. p.236-237.

Preliminary data on foraminiferal biocoenoses from Terra Nova Bay are presented. Samples IB and ID are studied in detail. Living isolated specimens from other samples (B, D, PQ series) are considered as well. Foraminiferal biocoenoses almost completely consist of agglutinated taxa; living specimens with calcareous wall are rare. Thanatocoenoses are exclusively made of agglutinant taxa, thus suggesting the calcite dissolution. Three assemblages are distinguished on the basis of foraminiferal abundance and diversity. Their distribution seems to be controlled by the bottom depth.

B-53907

Albertelli, G., Arnaud, P.M., **Ecological aspects of the deep macrobenthos of the Ross Sea: the bivalves,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part II, physical, chemical and biological oceanography, Genoa, 1990, p.241-245, 11 refs.

During Jan. 1988, 62 benthic operations were carried out in Terra Nova Bay between 163 and 1100 m depths, collecting 388 specimens of living bivalves belonging to 18 different species. These are presented in tables in two bathymetric groups: those from the pseudobathyal zone (215-450 m, 34 specimens, 9 species), and those from the upper bathyal zone (550-1100 m, 354 specimens, 13 species). Ethological aspects are discussed.

B-53908

Sará, M., et al, **Hard bottom zoobenthos: an analysis of its composition, distribution and of the adaptive strategies of the species,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part II, physical, chemical and biological oceanography, Genoa, 1990, p.249-260, Refs. p.259-260.

This report provides the following: description, distribution and ecology of some zoobenthic groups from Terra Nova Bay (Porifera and Coelenterata); basic data on the environmental impact and short- and long-term dynamics; and considerations related to biogeography, evolution and phylogenetic relationships.

B-53927

Moreno, J., Bustamante, J., Viñuela, J., **Nest maintenance and**

stone theft in the Chinstrap penguin *(Pygoscelis antarctica).* 1. Sex roles and effects on fitness, *Polar biology,* Sep. 1995, 15(8), p.533-540, Refs. p.539-540.

Chinstrap penguins, after being relieved from incubation, collect stones from the ground or steal them from other nests and incorporate them into their own nests. The variation in stone-collecting behavior after incubation reliefs, nest defense intensity and nest weights were measured in a sample of 100 nests in a large subcolony sited in the Vapour Col Chinstrap penguin colony on Deception I. Males collected more and larger stones, stole more stones and were more aggressive in nest defense towards potential thieves than females. The intensity of stone collection and theft by males was positively correlated with the increase in nest weight and with the final nest weight attained, while nest defense intensity by males and females was positively correlated with initial and final nest weight. Flooding after a snow storm affected 31% of nests and caused the loss of up to 14% of eggs/hatchlings. Flooded nests were significantly smaller than non-flooded nests. (Auth. mod.)

B-53928

Carrascal, L.M., Moreno, J., Amat, J.A., **Nest maintenance and stone theft in the Chinstrap penguin *(Pygoscelis antarctica).* 2. Effects of breeding group size,** *Polar biology,* Sep. 1995, 15(8), p.541-545, 21 refs.

The intensity of stone collection and stone theft by breeding Chinstrap penguins was measured, and estimations made of the number of stones per nest in large (>400 nests) and small subcolonies (<50 nests) in the large Vapour Col colony on Deception I. Stone availability was significantly higher both inside and outside small subcolonies. Penguins carried stones to the nest at the same rate in large and small subcolonies, but stole more intensively in large subcolonies. Stones obtained by theft were significantly larger than those collected elsewhere. The greater theft pressure in large subcolonies was accompanied by more aggressive defense by nest owners and by reduced success in stealing. However, the reduced availability of stones on the ground near large subcolonies led to a significantly lower number of stones per nest than in small subcolonies. These results are interpreted in the light of the geometric effects of breeding group size (perimeter to surface ratio) on stone accessibility. (Auth. mod.)

B-53929

Ramaiah, N., **Summer abundance and activities of bacteria in the freshwater lakes of Schirmacher Oasis, Antarctic,** *Polar biology,* Sep. 1995, 15(8), p.547-553, Refs. p.552-553.

Bacterial biomass and heterotrophic potential (using ^{14}C-labeled glucose, glutamic acid and sodium acetate) of water, ice and sediment microbial populations were studied from different lakes of the Schirmacher Ponds. Epifluorescence counts of total bacteria in these lakes were observed to be lower when compared to some of the ultra-oligotrophic antarctic lakes. Biovolumes of bacteria from different samples did not show significant variations, suggesting that regulatory factors were oligotrophy and low temperatures rather than microzoan grazing. Microbial uptake rates of glutamic acid were generally the fastest, followed by glucose and/or sodium acetate in the lakewater samples. Results of this study are potentially useful in recognizing the relative abundance and activity of limnetic microbial populations in the Schirmacher Ponds during summer—the active period of microbial growth—and for comparing their activities with other ecosystems elsewhere in continental Antarctica. (Auth. mod.)

B-53930

James, M.R., Pridmore, R.D., Cummings, V.J., **Planktonic communities of melt ponds on the McMurdo Ice Shelf, Antarctica,** *Polar biology,* Sep. 1995, 15(8), p.555-567, Refs. p.566-567.

The planktonic community of 20 melt ponds on the McMurdo Ice Shelf was investigated to determine taxa abundance and diversity and the controlling environmental variables. Grazing rates were measured using fluorescent beads to examine trophic interactions between ciliates, bacteria and phytoplankton. The melt ponds contained a surprisingly varied planktonic community with relatively high abundance compared with antarctic continental lakes. There was a clear distinction between small, productive ponds dominated by bactivorous small ciliates, hymenostomes and heterotrophic cryptophytes and the larger, less productive ponds where these taxa were less abundant. The benthic mats of cyanobacteria and diatoms were potentially a source of food for some ciliate species but the majority were bacterivores. The absence of large herbivorous ciliates, the heterotrophic capabilities of cryptophytes and the broad ecological tolerances contributed to a planktonic community dominated by cryptophytes. (Auth.)

B-53931

Wilson, R.P., Pütz, K., Charrassin, J.B., Lage, J., **Artifacts arising from sampling interval in dive depth studies of marine endotherms,** *Polar biology,* Sep. 1995, 15(8), p.575-581, 18 refs.

Most depth recorders used to study the diving behavior of polar marine endotherms record depth data at specific time intervals. The length of recording interval can have potentially profound implications for the interpretation of the data. The authors used data acquired on the diving behavior of king penguins to examine the validity of various analyses routinely conducted on depth data. In these experiments, increasing the sampling interval led to an underestimation of the number of dives performed, an overestimation in mean dive duration and substantial changes in the form of the dive profile. Analysis indicates that depth data should be recorded at a minimum rate corresponding to 10% of the total dive duration and that conventional dive profile categorization may be inappropriate. Alternatives that are less subjective and based on curve fits of dive depth versus time are proposed. (Auth.)

B-53932

Pasternak, A.F., **Gut contents and diel feeding rhythm in dominant copepods in the ice-covered Weddell Sea, March 1992,** *Polar biology,* Sep. 1995, 15(8), p.583-586, 25 refs.

Zooplankton was sampled at a diurnal station during the drift of the Ice Station Weddell-1 in the western Weddell Sea in Mar. 1992. Gut contents of *Metridia gerlachei, Calanoides acutus, Calanus propinquus* and *Rhincalanus gigas* were studied. *C. acutus* was trophically inactive, but 18, 33 and 45% of *C. propinquus, R. gigas* and *M. gerlachei,* respectively, contained food in their guts. Diel changes in gut levels and percentage of individuals with full guts with maximum during the dark period were observed in *M. gerlachei* copepodite stage V and females. The possible reasons for observed differences in foraging patterns of the four copepod species are discussed. (Auth.)

B-53933

Ruzicka, J.J., Radtke, R.L., **Estimating the age of antarctic larval fish from otolith microstructure using light end electron microscopy,** *Polar biology,* Sep. 1995, 15(8), p.587-592, 19 refs.

Larval fish of Antarctica have very narrow rings on their otoliths (<1 μm) that may not be resolved with light microscopy. In this study, age data from the otoliths of larval Nototheniidae *(Gobionotothen gibberifrons* and *Lepidonotothen larseni),* determined using light and scanning electron microscopy, are compared. Rings 0.4 μm wide were observed on otoliths viewed under electron microscopy; however, light microscopy could only resolve rings ≥0.5 μm wide. Scanning electron microscopy is more time consuming and costly than light microscopy but has greater resolving power and is recommended to validate ring counts made using light microscopy in otolith studies with antarctic larval fish. (Auth.)

B-53934

Gómez, I., Westermeier, R., **Energy contents and organic constituents in antarctic and south Chilean marine brown algae,** *Polar biology,* Sep. 1995, 15(8), p.597-602, Refs. p.601-602.

The content of proteins, lipids and carbohydrates and the calorific contents in 6 antarctic and 3 south Chilean brown algae were determined. These constitute the first reports of chemical composition in the endemic antarctic species *Cystosphaera jacquinotii, Phaeurus antarcticus* and *Desmarestia antarctica.* There were no marked differences in total energy levels between antarctic and cold-temperate species. However, species such as *Adenocystis utricularis* showed significantly higher ash-free energy (26.3 kJ), which is explained in terms of morpho-functional differentiation. *Ascoseira mirabilis* and *P. antarcticus* showed high total lipids (2.1-2.2% dry weight) and soluble carbohydrates (5.9 and 3.4% dry weight). In general, algae from Chile had similar energy levels and no obvious differences in organic content could be found. (Auth.)

B-53935

Laturnus, F., **Release of volatile halogenated organic compounds by unialgal cultures of polar macroalgae,** *Chemosphere,* Sep. 1995, 31(6), p.3387-3395, 36 refs.

The release of volatile halogenated organic compounds (VHOC) by different cultivated arctic and antarctic brown, red and green macroalgae was monitored in laboratory experiments. Isolation and identification of VHOC was performed by a purge and trap technique and capillary gas chromatography with electron capture detection. By using a column with high stationary phase thickness, 11 compounds from bromomethane to diiodomethane were separated and their release rates determined. Of all compounds investigated, bromoform is released in highest quantities from all species studied. Significant linear correlations of bromoform with the halogenated methanes and ethanes investigated suggest an enzymic formation for each single compound. The results are discussed with relation to a possible influence of VHOC on atmospheric ozone depletion in the polar regions. (Auth. mod.)

B-53938

Hovenden, M.J., Seppelt, R.D., **Utility of modulated fluorescence in measuring photosynthetic activity of antarctic plants: field and laboratory studies,** *Australian journal of plant physiology,* 1995, 22(2), p.321-330, 61 refs.

Lichens dominate the terrestrial vegetation of Antarctica and are therefore of great interest. Lichen photosynthesis has been shown to be dependent upon thallus water content and temperature as well as the irradiance incident on the thallus. Conventional infrared gas analysis (IRGA) techniques have been used most widely to study lichen photosynthesis in both the field and laboratory. Recent progress in the development of pulse amplitude modulated fluorescence systems has allowed the investigation of chlorophyll fluorescence in the field under naturally illuminated conditions. This paper highlights the utility of modulated fluorescence systems for the study of antarctic lichen photosynthesis, relates fluorescence results to those obtained by IRGA techniques, identifies problems inherent in fluorescence analysis of lichens and discusses possible areas of future research. (Auth.)

B-53942

Schneppenheim, R., Kock, K.H., Duhamel, G., Janssen, G., **On the taxonomy of the *Lepidonotothen squamifrons* group (Pisces, Perciformes, Notothenioidei),** *Archive of fishery and marine research,* 1994, 42(2), p.137-148, With French and German summaries. 29 refs.

The *Lepidonotothen squamifrons* group has been described to be comprised of three species: *L. squamifrons, L. kempi* and *L. macrophthalma.* All three species closely resemble each other and morphological and meristic characters used to distinguish between species are overlapping. Enzyme electrophoresis has been applied to specimens morphologically recognized as *L. squamifrons* and *L. kempi* from various localities in the Scotia Arc region and the Kerguelen Is. to assist in clarifying their taxonomic status. Results suggest that both "species" represent only populations of one species. Evidence is presented that the third species of the group, *L. macrophthalma,* may also be identical with *L. squamifrons* and that the *L. squamifrons* "group" is comprised of only one species, *L. squamifrons.* The authors found no statistically significant difference in allele frequencies between specimens from geographically isolated shelf areas of the Scotia Arc. This does not necessarily mean that the Scotia Arc region is inhabited by a single population but suggests some gene flow between shelf areas via larval drift for which evidence exists. (Auth.)

B-53945

Wang, Z.P., Norman, F.I., **Dynamics of population of south polar skua in Larsemann Hills, Antarctica,** *Antarctic research (Chinese edition),* June 1995, 7(2), p.25-31, In Chinese with English summary. 9 refs.

The population dynamics of the south polar skua *Catharacta maccormicki* in Larsemann Hills, investigated from 1988 to 1994, are discussed. Results show that the size of skua populations is positively related to station activities, including the number of visitors. The human impact is manifest in the maiming of the birds, availability of refuse as food supply and an unfavorable breeding environment.

B-53947

Zhu, G.H., Ning, X.R., Chen, Z.Y., Liu, Z.L., **Clustering analysis of net phytoplankton in Prydz Bay and its adjacent waters, Antarctica, during the austral summer 1991-1992,** *Antarctic research (Chinese edition),* June 1995, 7(2), p.38-44, In Chinese with English summary. 13 refs.

During the austral summer 1991-1992, studies on species composition, abundance distribution and ecological group of net phytoplankton in Prydz Bay and its adjacent waters were carried out. Seventy-eight taxa belonging to 26 genera and 3 phyla were identified, of which the percentage of diatoms was 87.2% and the other species 13.8%. The average cell abundance of phytoplankton was $120 \pm 173.8 \times 10^5$ cells/m^3. The area with high abundance of phytoplankton occurred at 62°S, 78-103°E, where cell abundances were 110×10^5-864×10^5 cells/m^3. According to cluster analysis of species composition and percent similarity of station clusters, phytoplankton communities were divided into 4 cluster-ecological groups: *Corethron criophilum* and *Rhizosolenia alata, Nitzschia* and *Synedra reinboldii, R. alata* and *S. reinboldii* and *Nitzschia* and *Chaetoceros* group. Discussion on the relationship between phytoplankton and the environmental parameters, and the comparisons between the results of present study and those of previous investigations, are made. (Auth.)

B-53949

Pu, J.B., Li, Z.P., Shao, M.H., Shang, L.S., **Survey of the environmental contamination state in King George Island, Antarctica,** *Antarctic research (Chinese edition),* June 1995, 7(2), p.51-58, In Chinese with English summary. 10 refs.

Based on the analytical results of surface soil, lichen and moss sampled from King George I. during 1992-1993, the concentration levels of 8 heavy metals (including As, Se) and 5 organic pollutants are discussed. It is indicated that the content distribution of heavy metals in the three environmental samples is very different. Lichen and moss showed different concentrating ability for different heavy metals. The contamination from 666, DDT, PCBs and oil is very obvious. The source of pollutants and a comparison with results of other researchers and the background level in some other areas in the world are also discussed. (Auth.)

B-53950

Sun, S., Wang, R., **Aging the antarctic krill,** *Antarctic research (Chinese edition),* June 1995, 7(2), p.59-62, In Chinese with English summary. 19 refs.

Problems related to krill age determination are discussed; various methods used in the analysis of krill population age structure are reviewed. (Auth.)

B-53951

Ashford, J.R., White, M.G., **Annual profile of growth in the otoliths of immature *Notothenia coriiceps* Richardson in relation to the environment at Signy Island, Antarctica,** *Antarctic science,* Dec. 1995, 7(4), p.345-349, 27 refs.

Scanning electron microscope and image analysis techniques were used to construct a profile of otolith growth from June 1987-June 1988 in immature *Notothenia coriiceps.* Growth was found to fluctuate seasonally with a large decrease between Aug. and late Nov. 1987. Examination of stomach fullness showed that fish continued to feed during winter. Increases in absolute light levels and sea temperature during spring were found to coincide approximately with increasing growth. No conclusive evidence distinguishing between hypotheses for limitation of growth either by seawater temperature or by resource availability was found. (Auth.)

B-53952

Duhamel, G., Ozouf-Costaz, C., Cattaneo-Berrebi, G., Berrebi, P., **Interpopulation relationships in two species of antarctic fish *Notothenia rossii* and *Champsocephalus gunnari* from the Kerguelen Islands: an allozyme study,** *Antarctic science,* Dec. 1995, 7(4), p.351-356, Refs. p.355-356.

Enzymatic polymorphism was used to detect variability within *Notothenia rossii* from two sites on the Kerguelen Plateau and *Champsocephalus gunnari* from the same sites and the South Orkney Is. No polymorphism was found in the second species and it was low but not statistically significant in the first. This apparent homogeneity does not substantiate suggestions from other results that the populations can be separated, especially in the case of *C. gunnari*. Other approaches will be necessary to solve definitively the question of population separation. (Auth.)

B-53953

Bester, M.N., Erickson, A.W., Ferguson, J.W.H., **Seasonal change in the distribution and density of seals in the pack ice off Princess Martha Coast, Antarctica,** *Antarctic science,* Dec. 1995, 7(4), p.357-364, 19 refs.

During the period Dec. 9, 1991-Feb. 4, 1992, shipboard and aerial surveys of seals in the pack ice off the Princess Martha Coast were made. A total of 18 half-nm-wide transects were flown censusing 481.3 nm^2 of pack ice within which 1437 seals were counted. The species composition of the seals was 94.4% crabeater, 3.4% Ross, 1.4% leopard and 0.8% Weddell seals. The data support the thesis that seal densities increase as the amount of pack ice diminishes with the advance of summer. Leopard seals were largely found near the retreating outer edge of the pack, and Weddell seals associated closely with the inshore fast ice, whilst both crabeater and Ross seals showed no statistically significant preference either for any part of the pack ice or for any particular geographical area covered in the present study. The high densities (0.45-2.91 seals/nm^2) and percentage species contribution (9.7-32.4%) of Ross seals determined by shipboard censuses in the same area during the early 1970s could not be confirmed in the present study, and it is likely that a real decrease in Ross seal numbers has taken place. (Auth.)

B-53954

Kasamatsu, F., Joyce, G.G., **Current status of Odontocetes in the Antarctic,** *Antarctic science,* Dec. 1995, 7(4), p.365-379, Refs. p.378-379.

The current status of antarctic odontocetes—sperm whales *Physeter catodon,* killer whales *Orcinus orca,* long-finned pilot whales *Globicephala melaena,* hourglass dolphins *Lagenorhynchus cruciger* and poorly known species of beaked whales (family Ziphiidae)—were studied in antarctic waters using data gathered in sighting surveys conducted from 1976-77 to 1987-88. Temporal variation in density demonstrated the different migration patterns by species, especially between sperm whale and killer whale. Spatial distributions during midsummer demonstrated different peaks of occurrence for each species by latitude that suggest possible segregation between the species. Consumption of food (mostly squid) by the Odontocetes is estimated as 14.4 million tonnes with 67% of the total consumed by beaked whales. Indirect consumption of antarctic krill through the predation of squid by beaked whales is estimated to be c. 24 million tonnes. This value is similar to the estimate of krill consumption by penguins in the Antarctic (33 million tones). Odontocetes, especially southern bottlenose whales, are suggested to have a much greater role in the antarctic ecosystem than has previously been considered. (Auth. mod.)

B-53955

Sun, S., De la Mare, W.K., Nicol, S., **Compound eye as an indicator of age and shrinkage in antarctic krill,** *Antarctic science,* Dec. 1995, 7(4), p.387-392, Refs. p.391-392.

Laboratory studies have shown that krill *(Euphausia superba)* shrink if maintained in conditions of low food availability. Recent studies have also demonstrated that *E. superba* individuals may be shrinking in the field during winter. If krill shrink during the winter, conclusions reached by length-frequency analysis may be unreliable because smaller animals may not necessarily be younger animals. In this study, the correlation between the body-length and the crystalline cone number of the compound eye was examined. Samples collected in the late summer show an apparent linear relationship between crystalline cone number and body-length. From a laboratory population, it appears that when krill shrink the crystalline cone number remains relatively unchanged. If it is little affected by shrinking, then the crystalline cone number may be a more reliable indicator of age than body-length alone. The ratio of crystalline cone number to body-length offers a method for detecting the effect of shrinking in natural populations of krill. On the basis of the crystalline cone number count, it appears from a field collection in early spring that *E. superba* do shrink during winter. (Auth.)

B-53956

Bayliss, P.R., Laybourn-Parry, J., **Seasonal abundance and size variation in antarctic populations of the Cladoceran *Daphniopsis studeri*,** *Antarctic science,* Dec. 1995, 7(4), p.393-394, 9 refs.

To compare seasonal variations occurring in populations of *Daphniopsis studeri* in two continental lakes, samples were collected throughout 1993 from Krok and Druzhby lakes in the Vestfold Hills. Numbers of *D. studeri* per unit volume, numbers of individuals with eggs and/or live young and prey abundance, expressed as total biomass of prey component of the plankton per liter, are shown in a table. The populations of *D. studeri* were high in late summer and decreased early in the winter period (May-Nov.). Prey abundance was higher in Krok Lake, and whilst the largest size of animal reached in both lakes is similar, population densities in Krok Lake were found to be substantially higher at particular times of the year. This would suggest that food availability is limiting the population in Lake Druzhby.

B-53963

Agraz, J.L., Quintana, R.D., Acero, J.M., **Terrestrial ecology of Danco Coast** [Ecología de los ambientes terrestres en punta Cierva (costa de Danco, península Antártica)], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1995, No.439, p.1-31, In Spanish with English summary. 32 refs.

Relationships among vegetation, fauna and environment at Cierva Point based on a relief of physical and biological variables sampled in eighty-four 25 m^2 stands were analyzed. These parameters were used as a basis for describing eleven environmental units. Data were processed by correlation, principal components and cluster analysis. The relative importance of regional environmental conditioning and effects due to human activities are discussed. (Auth.)

B-53964

Otero, A.R., Ortells, M., **Intravenous blood extracting method in penguins: a detailed description in *Pygoscelis papua*,** *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1995, No.444, p.1-7, With Spanish summary. 10 refs.

Three main extraction methods in penguins are reviewed: heart puncture, cannulization, and intravenous extraction. It is considered that the last may be the least harmful and the one with the largest range of uses. Taking into account that this method has not been described previously in detail, the several steps involved are explained. A procedure for trapping penguin specimens is also reported. (Auth.)

B-53965

Fernández, A.S., Najle, R., Curtosi, A., Galufa, I., Vodopivez, C., Solana, H., **Physiology and immunology in penguins in the wild** [Estudio de parámetros fisiológicos e inmunológicos de pingüinos antárticos al estado libre], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1995, No.441, p.1-12, In Spanish with English summary. 23 refs.

Serum samples were obtained from the three most abundant species of penguins found to the north of the Antarctic Peninsula, and submitted to electrophoresis. The patterns observed were similar to those of other birds, except for pre-albumin and gamma globulins. The immunoelectrophoretical study yielded an Ig M arc, two or three arcs of Ig G, an Ig N of faster migration or else another isotype of Ig G. The authors did not observe serum Ig A arcs. Blood cell series analysis was in agreement with a slight heterophilia.

B-53966

Solana, H., et al, **Kinetics of organometallic intoxication in antarctic fauna** [Estudio de la cinética de la intoxicación con organometálicos en fauna antártica], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1995, No.440, p.1-12, In Spanish with English summary. 20 refs.

Trimethyltin is a potent neurotoxin used in different industrial processes. Besides neurological damage after exposure to this compound, other organs and systems can be affected. Penguins *(Pygoscelis papua)* experimentally intoxicated with a single dose of 15 mg/kg showed, in less than 24 h, neurological signs and an increase of total serum proteins due to a change in the β globulin fraction and a fusion of $\alpha 1$ and $\alpha 2$ globulins. In addition, an increase in the serum levels of aspartate transaminase and alanine transaminase was observed in concordance with a decrease in the enzymatic activity of the liver. The birds seem to be highly sensitive to TMT; the results are in coincidence with changes in the cellular permeability. (Auth.)

B-53967

Hempel, G., **Weddell Sea: a high polar ecosystem,** Large marine ecosystems: patterns, processes and yields. Edited by K. Sherman, L.M. Alexander, and B.D. Gold, Washington, D.C., American Association for the Advancement of Science, 1992, p.5-18, Refs. p.16-18.

DLC QH541.5.S3L37

The heavy ice cover of the Weddell Sea ecosystem contributes to the overall low productivity of the pelagic component of the system. The pelagic fish *Pleuragramma antarcticum* replaces krill and the keystone species for the warm-blooded top predators, including crabeater seals, Weddell seals, and emperor penguins. Substantial pressure on key prey species is exerted on *Pleuragramma* and benthopelagic fish species by emperor penguins and Weddell seals in the vicinity of breeding sites. One of the largest shelf areas around the antarctic continent is found in the southern Weddell Sea. The northeast part of the shelf is rich in suspension feeders. Bryozoans are the principal component of the southern shelf community, while holothurians dominate the southern trench community. The relatively high abundance of epibenthic biomass is attributed to the high sedimentation rate of ice algae and phytoplankton that are not grazed down, but sink as aggregates in sedimentary bursts recorded in sediment traps, reaching an annual peak in December. (Auth. mod.)

B-53969

Helbling, E.W., Marguet, E.R., Villafañe, V.E., Holm-Hansen, O., **Bacterioplankton viability in antarctic waters as affected by solar ultraviolet radiation,** *Marine ecology progress series,* Oct. 1995, 126(1-3), p.293-298, 20 refs.

When natural assemblages from antarctic waters were incubated *in situ* at 0.5 m depth, the mean percentage survival fractions were 13% when the sample was exposed to all UVR, 17% when UV-B radiation was eliminated with a prefilter, and 85% when all UVR was excluded. The magnitude of UVR-induced inhibition decreased with depth so that there was no significant inhibition at 9.5 m. There was very little effect of photosynthetically available radiation (PAR), even at 0.5 m depth. The loss of viability due to UVR or PAR was much greater for the 2 isolated strains than for the natural bacterial assemblages. Exposure of the *Bacillus* sp. to incident PAR, PAR + UV-A, and PAR + UV-A + UV-B resulted in survival values of 9, 0.4, and 0.1%, respectively. When irradiance to the sample was reduced to about 3% of the incident value, the corresponding values were 80, 50, and 24%, respectively. With *Acinetobacter* sp., the corresponding values were 60, 13, and 1.5% with direct exposure to solar radiation, while at 12% of incident radiation no inhibition by either UVR or PAR could be detected. (Auth. mod.)

B-53970

Weimerskirch, H., Wilson, R.P., Guinet, C., Koudil, M., **Use of seabirds to monitor sea-surface temperatures and to validate satellite remote-sensing measurements in the southern ocean,** *Marine ecology progress series,* Oct. 1995, 126(1-3), p.299-303, 12 refs.

Changes in sea-surface temperature (SST) including the position of the sub-tropical convergence of the southern Indian Ocean were ascertained by using wandering albatrosses *Diomedea exulans* fitted with temperature recorders and by satellite tracking systems. Flight phases interspersed with frequent pauses on the sea means that albatrosses make useful tools for studying SST in the southern ocean, since *in situ* measurements (to validate satellite data) are rare because of the remoteness of the area. Comparison of satellite-derived data and measurements using albatrosses indicates a good relationship between the 2 sets of data. It is suggested that albatrosses could be useful for monitoring SST and validating satellite-derived data in remote areas of the southern ocean, particularly in winter when cloud cover precludes satellite measurements of SST. (Auth.)

B-53977

Karentz, D., Spero, H.J., **Response of a natural *Phaeocystis* population to ambient fluctuations of UVB radiation caused by antarctic ozone depletion,** *Journal of plankton research,* Sep. 1995, 17(9), p.1771-1789, 62 refs.

During the austral spring of 1990, rotation of the antarctic polar vortex resulted in a twofold change in ozone concentrations (170-380 Dobson units) over regions of the marginal ice zone of the Bellingshausen Sea. The changes in ozone caused significant variations in incident and in-water UVB fluences. Phytoplankton cell densities, nutrient concentrations, DNA concentrations and stable carbon isotope ratios ($\delta^{13}C$) of particulate organic and dissolved inorganic carbon were monitored for a 5-week period during the ozone fluctuations. *Phaeocystis* was the dominant phytoplankton taxon. Cell numbers were positively correlated to ozone and the $\delta^{13}C$ of seawater ΣCO_2, and negatively correlated to nutrient concentrations. The densities of co-occurring diatoms were not related to changes in ozone, $\delta^{13}C$ or nutrients. These observations suggest that *Phaeocystis* sp. responds very rapidly and adversely to increased UVB exposure, and that seawater $\delta^{13}C$ data may be a useful tool for assessing the physiological state of high-latitude marine communities relative to increased UVB levels. (Auth.)

B-53978

Froneman, P.W., McQuaid, C.D., Perissinotto, R., **Biogeographic structure of the microphytoplankton assemblages of the South Atlantic and the southern ocean during austral summer,** *Journal of plankton research,* Sep. 1995, 17(9), p.1791-1802, 41 refs.

Microphytoplankton distribution in the Atlantic sector of the southern ocean was investigated along a transect during the SAAMES II cruise in late austral summer (Jan.-Feb.) 1993. Samples were collected at ca. 60 km intervals between 34 and 70°S for the analysis of mineral nutrients and the identification and enumeration of microphytoplankton. Peaks in microphytoplankton abundance were recorded in the neritic waters of Africa and Antarctica, at all major oceanic fronts, and in the marginal ice zone (MIZ). Partial correlation analysis indicated that 45% of the total variance associated with microphytoplankton abundance could be explained by silicate and phosphate concentrations, while temperature accounted for 65% ($P<0.001$). Cluster and ordination analyses identified two major groups of stations, one north and one south of the Subantarctic Front (SAF). This division appears to be related to differences in temperature and silicate concentrations. Each region comprised distinct microphytoplankton subgroups associated with specific water masses or hydrological features. (Auth. mod.)

B-53979

Laybourn-Parry, J., Bayliss, P.R., Ellis-Evans, J.C., **Dynamics of heterotrophic nanoflagellates and bacterioplankton in a large ultra-oligotrophic antarctic lake,** *Journal of plankton research,* Sep. 1995, 17(9), p.1835-1850, 45 refs.

The abundance of both heterotrophic nanoflagellates (HNAN) and bacterioplankton in a large (9 km^2) ultraoligotrophic antarctic lake (Krok Lake) were investigated from Dec. 1992 until Nov. 1993. HNAN abundance peaked in spring, summer and autumn, falling to lowest numbers during the winter. Bacterioplankton abundance was highest during the late summer and then fell progressively towards winter and autumn. Mean cell volumes (MCV) of the bacteria reached their highest in spring, and consequently highest bacterial biomass occurred at this time. Bacterial production measurements following the incorporation of [^3H] thymidine into DNA and [^{14}C] leucine into protein using a double labelling procedure were undertaken in Jan., June, Aug., Oct. and Nov. On occasion, a significant difference in production rates based on the uptake of leucine and thymidine was observed, suggesting unbalanced growth. Highest rates of production coincided with times of high dissolved organic carbon levels in the water column and lowest production with low levels of DOC. (Auth. mod.)

B-53981

Amsler, C.D., Rowley, R.J., Laur, D.R., Quetin, L.B., Ross, R.M., **Vertical distribution of antarctic peninsular macroalgae: cover, biomass and species composition,** *Phycologia,* Sep. 1995, 34(5), p.424-430, Refs. p.429-430.

The biomass and percentage cover of subtidal macroalgae were recorded a 5 sites near Anvers I. along the Antarctic Peninsula in 1989. Total macroalgal wet biomass ranged from 1.64 to 6.34 kg/m^2. The largest biomass contributors were the large overstory brown algae (Phaeophyceae) *Desmarestia antarctica, D. menziesii, D. anceps* and *Himantothallus grandifolius.* These species had an overall cover of 72% of the bottom. *D. menziesii* and/or *D. anceps* were dominant at 2 and 5 m. *D. antarctica* dominated the overstory at 10 and 15 m. *H. grandifolius* was also abundant at 15 m and dominated at 20 m. Several red macroalgae (Rhodophyta) were also conspicuous: *Iridaea cordata* and *Curdiea racovitzae* at 2 and 5 m; *Myriogramme mangini* and *Plocamium cartilagineum* at 10 and 15 m; and *Gigartina skottsbergii* and *Sarcodia montagneana* at 15 and 20 m. The presence of large quantities of epilithic *D. antarctica* at 10 and 15 m was very unusual, as this species has previously been described as an obligate epiphyte with a depth distribution restricted to <10 m. (Auth. mod.)

B-53985

Holm-Hansen, O., Lubin, D., Helbling, E.W., **Ultraviolet radiation and its effects on organisms in aquatic environments,** Environmental UV photobiology, edited by A.R. Young, L.O. Björn, J. Moan and W. Nultsch, New York, Plenum Press, 1993, p.379-425, Refs. p.418-425.

DLC QP82.2.U4E85

Because the most rapid changes in incident UV-B radiation occur under the ozone hole in the Antarctic, there have been extensive studies to ascertain whether or not enhanced UV-B radiation resulting from ozone depletion in the stratosphere will have any calamitous effects on the southern ocean ecosystem. Some findings from these studies concerning Antarctica are outlined in eight pages of this chapter, including incubator experiments, *in situ* incubation, and effect of enhanced UV-B radiation.

B-53993

Zhong, X.F., Wang, R., **Reproductive characteristics of antarctic krill, *Euphausia superba* Dana, in the Prydz Bay region,** *Antarctic research,* June 1995, 6(1), p.58-72, Refs. p.71-72.

Experiments and observations on reproduction of krill were conducted during the summer of 1993 in Prydz Bay. The development of ovarian oocytes in gravid females, spawning episodes, and brood size were studied. The sexual maturity process and spawning season are discussed. Fifty-three live gravid females captured at two stations in Jan. 1993 were cultured in a cool-room. They spawned within 1 to 16 days after capture. Most of them spawned only once except for two, who spawned again on the 5th and 7th day after first spawning. The brood size of first spawning ranged from 225 to 5919 eggs, with an average of 2132 eggs. The second brood was rather small, about 500 eggs. There were 0-213 (mean 32) mature oocytes in the post-spawn ovaries, and revitellogenesis was not observed. Brood size increased with increased body length, but the correlation was not good. The number of ovarian oocytes in gravid female ranged from 2188 to 9263, with a mean of 5283. The composition of oocytes varied in different samples. (Auth. mod.)

B-53994

Mao, X.H., Li, B.H., Huang, F.P., **Pigmental composition and the absorption spectral analysis of Ulothrix sp. and benthic diatoms in the intertidal zone of Great Wall Station, Antarctica,** *Antarctic research,* June 1995, 6(1), p.73-78, 9 refs.

Results of the absorption spectral analysis of Ulothrix sp. attached to rocks in the intertidal zone at the Great Wall Station in Feb. 1989, and of the benthic diatoms growing in the area, are reported. Six kinds of pigments were separated and identified in benthic diatoms: carotene, chlorophyll-*a*, fucoxanthin, chlorophyin, neoxanthin and chlorophyll-*c*. Nine kinds of pigments were identified in Ulothrix sp.: carotinoid, pheophytin, chlorophyll-*a*, -*b*, chlorophyllin, chlorophyllide-*a*, neoxanthin, chlorophyll-*c* and pheophytin-*c*. The intertidal benthic diatoms and Ulothrix sp. have specific absorption spectra; there are also marked differences in the composition of their algal pigments. Since the pigments of marine algae show differences in their absorption spectra, the absorption spectrum can be used to identify the species of marine algae. (Auth.)

B-54004

Creet, S., Van Franeker, J.A., Van Spanje, T.M., Wolff, W.J., **Diet of the Pintado Petrel *Daption capense* at King George Island, Antarctica, 1990/91,** *Marine ornithology,* 1994, 22(2), p.221-229, 23 refs.

During the Dutch Expedition to King George I. in 1990-91, complete stomach contents of Pintado or Cape Petrels *Daption capense* were sampled by means of the stomach-flushing method. Food samples consisted of antarctic silverfish *Pleuragramma antarcticum* by 60% of mass. The remainder of the mass was made up mainly of amphipods (various Eusiridae, Lyssianassidae, Calliopidae, and Hyperiidea) and krill *Euphausia superba.* Previous studies of breeding Pintado Petrels have reported a diet dominated by crustacean prey with a fish component of less than 30% by mass. This discrepancy could be due to former studies being largely based on small quantities of regurgitated food, and not on complete stomach contents. From a small number of their samples the authors conclude that nonbreeding birds may differ in diet from birds rearing chicks, and that this could be influenced by local conditions. A major importance of fish throughout the nonbreeding seasons is indicated in recent literature. (Auth. mod.)

B-54005

Bost, C.A., Pütz, K., Lage, J., **Maximum diving depth and diving patterns of the Gentoo penguin *Pygoscelis papua* at the Crozet Islands,** *Marine ornithology,* 1994, 22(2), p.237-244, Refs. p.243-244.

The diving behavior of breeding Gentoo penguins *Pygoscelis papua* was investigated at the Crozet Is. during Oct. and Nov. 1991. Results from 15 birds showed that the individual maximum dive depths ranged from 40-210 m. One continuous dive record from a data logger from one trip of 9.5 h made by a female involved 103 dives greater than 10 m. Two categories of dives were reported: shallow dives (less than 5 m), and "deep" dives, mostly flat-bottomed dives. The accumulated time spent shallow and flat-bottomed diving was 24.5 and 75.4% of the total time spent under water, respectively. Dive duration was positively related to maximum depth. There was a positive relationship between the time spent at the bottom and depth. Stomach flushing indicated that the prey was exclusively *Euphausia vallentini.* The pattern of diving and the maximum diving depth are compared with those obtained at more southerly localities. (Auth.)

B-54006

Capdeville, D., Huin, N., Jacquet, L., **First record of Chinstrap penguin *Pygoscelis antarctica* breeding in Adélie Land, Antarctica,** *Marine ornithology,* 1994, 22(2), p.245-246, 11 refs.

During a Jan. 1991 visit the authors observed an adult Chinstrap penguin defending an empty nest in a colony of Adélie penguins at Mont du Sphinx on Port-Martin Nunatak. During the Jan. 1992 visit, a single emancipated silvery-grey chick was observed in the same area of the colony and identified as a Chinstrap penguin in secondary down from Harrison (1983). This is the first report of definite breeding by the Chinstrap penguin in Adélie Coast.

B-54008

Scientific Committee on Antarctic Research, **Working Group on Biology. Bird Biology Subcommittee minutes of meeting, 26-27 May 1994, Padua, Italy,** *Marine ornithology,* 1994, 22(2), p.253-268, 29 refs.

The main matters discussed at the SCAR Bird Biology Subcommittee meeting included the Central Data Bank for antarctic bird banding, recent publications on antarctic and subantarctic birds, synthesis of data on distribution and abundance of those birds, international research projects, reports on researcher-seabird interactions, relations with CCAMLR and with SCAR bodies and programs, and bird conservation.

B-54016

Peck, L., Morgan, G., Shanklin, J., **New type of bryozoan from Antarctica,** *NERC news,* Oct. 1995, No.33, p.25-27.

The British Antarctic Survey (BAS) has recently found a bryozoan from ice-bound high antarctic waters in the Weddell Sea which has a completely different mode of life from any previously discovered. Its life style is so unusual that it poses interesting questions about the evolution of the group and the adaptation of bryozoans to their environment.

B-54034

Nevitt, G.A., Veit, R.R., Kareiva, P., **Dimethyl sulphide as a foraging cue for antarctic Procellariiform seabirds,** *Nature,* Aug. 24, 1995, 376(6542), p.680-682, 30 refs.

Presented here is experimental evidence that Procellariiform seabirds can use a naturally occurring scented compound, dimethyl sulphide, as an orientation cue. Dimethyl sulphide has been studied intensely for its role in regulating global climate and is produced by phytoplankton in response to zooplankton grazing. Zooplankton, including antarctic krill, are in turn eaten by seabirds and other animals. Results from controlled behavioural experiments performed at sea show that many Procellariiforms can detect dimethyl sulphide, and that some species (for example, storm petrels) are strongly attracted to it. This appears to constitute the first evidence that dimethyl sulphide is part of the natural olfactory landscape overlying the southern oceans. (Auth. mod.)

See also:
A-51684 A-51686 A-51777 A-51963 A-51991 A-52063 A-52196
A-53566 D-51860 D-53638 D-54033 E-51704 E-51821 E-51915
E-51920 E-52070 E-52072 E-52109 E-52110 E-52111 E-52112
E-52113 E-52119 E-52179 E-52191 E-52221 E-52244 E-52314
E-52319 E-52399 E-52410 E-52411 E-52437 E-52449 E-52470
E-52526 E-52536 E-52591 E-52662 E-52748 E-52750 E-52820
E-52884 E-52986 E-52993 E-53000 E-53009 E-53010 E-53078
E-53081 E-53129 E-53153 E-53155 E-53156 E-53157 E-53160
E-53161 E-53162 E-53163 E-53164 E-53166 E-53168 E-53170
E-53189 E-53253 E-53270 E-53310 E-53312 E-53370 E-53605
E-53814 E-53829 E-53958 F-51689 F-52465 F-52618 F-52718
F-53495 F-53695 F-53822 G-52085 G-52376 G-53557 G-53700
G-53737 G-54014 G-54036 H-52278 H-52692 I-51977 I-52073
I-52149 I-52287 I-52727 I-52829 I-52865 I-53145 I-53316
I-53444 I-53995 J-51742 J-51832 J-51983 J-51988 J-52172
J-52215 J-52219 J-52228 J-52280 J-52303 J-52365 J-52412
J-52515 J-52733 J-52741 J-52742 J-52743 J-52744 J-52747
J-52992 J-53005 J-53043 J-53046 J-53276 J-53517 J-53536
J-53548 J-53726 J-53759 J-53765 J-53766 J-53767 J-53769
J-53771 J-53772 J-53773 J-53778 J-53780 J-53812 J-53823
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J-53866 J-53869 J-53873 J-53874 J-53884 J-53901 J-53909
J-53989 K-53937 M-51827 M-52065 M-52066 M-52097
M-52668 M-53001 M-53175 M-53176 M-53177 M-53178
M-53179 M-53291 M-53292 M-53293 M-53294 M-53295
M-53296 M-53297 M-53298 M-53299 M-53300 M-53301
M-53302 M-53303 M-53330 M-53353 M-53354 M-53355
M-53356 M-53357 M-53419 M-53524 M-53531 M-53584
M-53984 M-53986 M-53987 M-53988

C. CARTOGRAPHY

C-51672

Wilson, T.J., Bradford, S.C., **Satellite-image analysis of the Transantarctic Mountains, southern Victoria Land,** *Antarctic journal of the United States,* 1993, 28(5), p.23-26, 5 refs.

Uplift of the Transantarctic Mountains occurred during Mesozoic and Cenozoic breakup of the Gondwana supercontinent. The geometry and displacement history of structures associated with this rifting and uplift constitute one key to unraveling the relative motions of west antarctic crustal blocks with respect to cratonic East Antarctica as the breakup progressed. Structural mapping over a large area is required to determine the geometry of faults that control the regional architecture of the Transantarctic Mountains. Here the authors report on the use of Landsat Thematic Mapping (TM) satellite imagery as a tool for regional structural mapping in Antarctica. The sample of features identified on the Landsat TM image highlights the utility of satellite imagery for geological research in Antarctica.

C-51725

Sun, J.B., Gan, X.Z., **Digital mapping produced with satellite image of the Zhongshan Station area in Antarctica,** *Antarctic research,* June 1994, 5(1), p.34-43, 9 refs. For Chinese original see 21C-48774.

Based on difficulties in processing satellite images of Antarctica in digital mapping, a filtering procedure to remove the streaking noise and enhance the clarity of the image is described.

C-51764

Gantar, C., **OGS maps of south circumpolar areas,** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.291-298, 7 refs.

Map information is a basic tool in earth science data analysis and must satisfy certain requirements for easy consultation and comparison. Thus, a suitable projection (polar stereographic with a contracting factor k=0.95 at the South Pole) and a convenient sheet format were chosen at OGS for planning, presentation and evaluation of the marine geophysical cruises in Antarctica under the Italian Antarctic Project. A polynomial in latitude is given to provide easy conversion from geographic to plane coordinates and vice-versa. (Auth.)

C-51810

Johnson, A.C., et al, **Preliminary aeromagnetic anomaly compilation map for the Weddell Province of Antarctica,** Recent progress in antarctic earth science. Edited by Y. Yoshida et al., Tokyo, Terra Scientific Publishing Company (TERRAPUB), 1992, p.545-553, 52 refs.

A preliminary aeromagnetic anomaly map of the Weddell Province of Antarctica is presented. The map is a compilation of British and Soviet reconnaissance surveys and represents the first stage of a unified geophysical database for this geologically complex region of Antarctica. The two data sets have been merged and smoothed, hence anomalies on the map represent large-scale crustal features. The Pacific Margin Anomaly (PMA) extends along the Antarctic Peninsula and Ellsworth Land as far as Thurston I. and reflects a linear mafic-intermediate batholith. High-frequency anomalies around Haag Nunataks are associated with exposed Precambrian basement, which may also lie beneath parts of the Ronne Ice Shelf. Low magnetic gradients over the Weddell Sea Embayment and Ronne Ice Shelf imply a magnetic basement beneath a thick sedimentary cover. The E-W trending Orion Anomaly may represent the Continent-Ocean boundary in this area. The eastern part of the map is dominated by the arcuate Explora Anomaly (EA), which runs parallel to the coasts of Queen Maud Land and Coats Land and is associated with the volcanic Explora Wedge. The large positive anomaly over Berkner I. is interpreted as a Precambrian East Antarctic craton, exposures of which correlate with some of the anomalies in Coats Land and Queen Maud Land. Shorter wavelength anomalies seen, for example, in Queen Maud Land and the Ellsworth-Whitmore-Thiel mountains area, result from Middle Jurassic intrusives related to the breakup of Gondwana. (Auth.)

C-51811

Johnson, A.C., Smith, A.M., **New aeromagnetic map of West Antarctica (Weddell Sea Sector): introduction to important features,** Recent progress in antarctic earth science. Edited by Y. Yoshida et al., Tokyo, Terra Scientific Publishing Company (TERRAPUB), 1992, p.555-562, 35 refs.

Between 1973 and 1987 the British Antarctic Survey (BAS) conducted 8 reconnaissance aeromagnetic surveys covering an area which includes the Antarctic Peninsula, Ronne Ice Shelf, Ellsworth Land and the area between the Ellsworth, Whitmore and Thiel mountains. Over 114,000 line-km of data have been acquired. The profile data were filtered heavily to produce the new map, which is thus restricted to showing only the major regional anomalies which reflect gross crustal structure rather than local shallow sources. The dominant feature of the map is the Pacific Margin Anomaly (PMA) which extends without a break along the Pacific margin of the Antarctic Peninsula and Ellsworth Land. The PMA is restricted to the oceanward half of the exposed Mesozoic-Cenozoic magmatic arc and is related to a linear mafic-intermediate batholith complex. A distinctive region of high amplitude anomalies surrounds Haag Nunataks and suggests that the Precambrian rocks exposed there extend beneath parts of the Ellsworth Mountains and Ronne Ice Shelf. The remainder of Ronne Ice Shelf is characterized by long-wavelength anomalies representing sources beneath a deep sedimentary basin. (Auth. mod.)

C-51850

Carsey, F.D., **Progress in polar oceans research using ERS-1 data,** International Geoscience and Remote Sensing Symposium, Pasadena, CA, Aug. 8-12, 1994. Proceedings, Vol.4, Piscataway, NJ, Institute of Electrical and Electronics Engineers, Inc., 1994, p.1957-1958, 2 refs.

Data from ERS-1, especially from the Active Microwave Instrument Image Mode, or SAR, have been particularly useful in providing data on ice type and motion and oceanic mesoscale features. These data have been used in studies of ocean and ice circulation, climate processes, mesoscale processes near the ice edge, freshwater fluxes, and convection, and have also proved useful in support of operations in ice covered seas. (Auth. mod.)

C-51944

Angrisano, G., **Hydrographic surveying and nautical charting: a coordinated effort of the International Hydrographic Organization (IHO),** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.413-417.

The International Hydrographic Organization (IHO), which is fast moving towards the standardization of nautical charting, attaches great importance to the rapidly increasing needs of safety of navigation in antarctic waters due to the numerous scientific vessels navigating around the continent, as well as the growing number of tourist trips being organized. The members of the IHO feel that it is their responsibility to intervene in the coordination of hydrography and charting in that environmentally difficult sea area in order to achieve the best cost effectiveness ratio.

C-52121

Larsgaard, M.L., **Part II. Mapping of Antarctica,** *Western Association of Map Libraries. Occasional paper,* 1993, No.14, Topographic mapping of Africa, Antarctica, and Eurasia, p.57-70, Refs. p.69-70.

DLC GA125.L36

A review is presented of the history of the mapping of Antarctica, including cartographic activities during the International Geophysical Year and a list of maps completed from 1960 to 1965 by Australia, France, Japan, New Zealand, Norway, United Kingdom, the United States, and the USSR. Details about the maps, such as date of compilation, scale, source of information, and the name of the issuing party are given in chronological order.

C-52130

Larson, K.M., Freymueller, J., **Relative motions of the Australian, Pacific and Antarctic plates estimated by Global Positioning System,** *Geophysical research letters,* Jan. 1, 1995, 22(1), p.37-40, 14 refs.

Global Positioning System (GPS) measurements spanning 3 years have been used to determine velocities for 7 sites on the Australian, Pacific and Antarctic plates. The site velocities agree with both plate model predictions and other space geodetic techniques. No evidence is found for internal deformation of the interior of the Australian plate. Wellington, New Zealand, located in the Australian-Pacific plate boundary zone, moves 20±5 mm/yr west-southwest relative to the Australian plate. Its velocity lies midway between the predicted velocities of the two plates. Relative Euler vectors for the Australian-Antarctica and Pacific-Antarctica plates agree within one standard deviation with the NUVEL-1A predictions. (Auth. mod.)

C-52425

Raney, R.K., Falkingham, J.C., **RADARSAT and operational ice information,** Remote sensing of sea ice and icebergs. Edited by S. Haykin et al, New York, John Wiley & Sons, 1994, p.611-657, 47 refs.

DLC GB2401.72.R42 R46

RADARSAT will be the first high-resolution imaging system on a spacecraft to provide complete global coverage, including, in particular, the North and the South polar regions. Observations of the Arctic are of operational importance, particularly to Canada. Observations of Antarctica are of scientific importance and are a keystone of the cooperative agreement between Canada and the United States supporting the spacecraft launch. This chapter describes the RADARSAT mission and instrument, in the context of polar ice observations. Emphasis is placed on the capabilities of the imaging system and on the use of RADARSAT data in the context of operational ice monitoring in Canada. (Auth. mod.)

C-53364

U.S. Defense Mapping Agency. Hydrographic/Topographic Center, **Sailing directions (planning guide & enroute) for Antarctica, Pub. 200, second edition, 1992,** Washington, D.C., U.S. Defense Mapping Agency, 1992, 450p. + Appendices.

DLC VK805.S25

Pub. 200, Sailing Directions (Planning Guide) and (Enroute) for Antarctica is issued in Part One and Part Two with both Planning Guide and Enroute information combined in one volume. This publication has been corrected to Sep. 5, 1992, including Notice to Mariners No.36 of 1992. This information is provided for the region covering between 60°S and the coast of Antarctica. Sailing directions include detailed coastal and port approach information which supplements the latest revised prints of the largest scale chart on sale by the Defense Mapping Agency. An Index-Gazetteer of geographic names of the Antarctic, a route chart and atlas are provided in the back of the book.

C-53675

Mullen, R.R., Mullins, J.L., **Surveying and mapping program of the United States in Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.333-334.

The National Science Foundation (NSF), through the U.S. Geological Survey (USGS), supports surveying and mapping in Antarctica. During the 1992-93 season, the USGS National Mapping Division (NMD) directed its antarctic surveying and mapping activities toward the acquisition of global positioning system (GPS) geodetic mapping control, topographic and satellite image mapping, seismology, doppler satellite tracking, and the compilation of an antarctic gazetteer.

See also:
B-52059 B-53687 E-51893 E-51950 E-52434 E-53126 F-51819
F-51840 F-51841 F-51842 F-51843 F-51844 F-51845 F-51847
F-51851 F-52049 F-52050 F-52321 F-52426 F-52464 F-52466
F-52531 F-52613 F-52615 F-52634 F-52842 F-52866 F-52939
F-52942 F-52952 F-52973 F-52985 F-53090 F-53103 F-53174
F-53596 F-53597 F-53639 F-53810 F-53833 F-53911 F-54020
F-54022 I-51883 I-52362 I-52478 I-53047 J-51882 J-52469
J-52971 J-53371 J-53658 J-54021 L-51662

D. EXPEDITIONS

D-51860
Miller, H., ed, **Expedition ANTARKTIS-X of RV *Polarstern* 1992—Report of Legs ANT-X/1a and 2** [Die Expedition ANTARKTIS-X mit FS *Polarstern* 1992—Bericht von den Fahrtabschnitten ANT-X/1a und 2], *Berichte zur Polarforschung,* 1994, No.152, 292p. (Pertinent p. 71-292), In German with English summary.

Leg ANT-X/2 was planned mainly to answer geoscientific and glaciological questions, and included comprehensive work on land and ice. At Drescher Island, biologists observed the feeding and diving behavior of seals and penguins. They obtained new results on the ecophysiology of these animals using newly developed techniques to determine diving depths and feeding behavior. Glaciological work continued on the Ronne Ice Shelf. This long-term program is part of the International Filchner/Ronne Ice Shelf Programme, and includes studies of mass balance and dynamics of the ice shelf. Particular attention was given to processes on the underside of the ice shelf. Comprehensive ground truth observations for the SAR and altimeter of ERS-1 were carried out, and measurements of the movement and deformation of the ice shelf continued. Studies of the dynamics and mass balance of the sea ice were made using various satellite data and through direct observations of buoys and a helicopter mounted camera. The main tasks of the marine program were geophysical measurements of Earth's crust and its sediment cover and parallel marine geological investigations. Work continued on the Antarctic Peninsula and at Astrid Ridge, and mapping of sediment cover and deep crustal structures was completed.

D-52348
Jacka, F., ed, Jacka, E., ed, **Mawson's antarctic diaries,** Sydney, Allen & Unwin Pty Ltd, 1991, 414p., Bibliography p.405-406.

DLC G875.M33A3

This book brings together all the descriptive writings of the explorer D. Mawson while in the Antarctic: in 1907-09 with Shackleton's British Antarctic Expedition; in 1911-14 as leader of the Australasian Antarctic Expedition; and twice between 1929 and 1931 as leader of the British, Australian and New Zealand Antarctic Research Expedition.

D-52570
Naruse, R., **Activities of the summer party of the 34th Japanese Antarctic Research Expedition in 1992-1993,** *Antarctic record,* 1994, 38(3), p.252-267, In Japanese with English summary. 19 refs.

The JARE-34 expedition consisted of 39 members of the wintering party, 16 members of the summer party, and 2 scientists from China and Australia. The icebreaker *Shirase* arrived at Showa Station on Dec. 30, 1992. Cargo transportation over ice to Showa and Station S16, including a total of 960 t freighted by helicopter and oversnow vehicles, was carried out between Dec. 18, 1992, and January 1993. Various studies were carried out at Showa Station, including meteorological, geophysical, geological, and biological observations. Marine biology research, using trawl nets and other types of nets, was carried out in Lützow-Holm, Amundsen-Casey and Prydz bays. (Auth. mod.)

D-52605
Østerhus, S., **General report on the 1991/92 NARP expedition,** *Norsk Polarinstitutt. Meddelelser,* 1994, No.124, Report of the Norwegian Antarctic Research Expedition 1991/1992. Edited by S. Østerhus, p.5-7.

The Norwegian Antarctic Research Expedition (NARE) 1991-92 was part of the Nordic Antarctic Research Programme (NARP) which also includes the Finnish Antarctic Research Programme (FINNARP) and the Swedish Antarctic Research Programme (SWEDARP). FINNARP was in charge of transportation to and from the Antarctic. The Russian ship *Akademik Fedorov* was used for transport of equipment and personnel from Montevideo to Queen Maud Land. Three research programs were carried out: monitoring of seabirds at Svarthamaren; oceanography, glaciology, and geology at Fimbul Ice Shelf; and glaciology at Riiser-Larsen Ice Shelf and Kraul Mountains.

D-53136
Wiese, K., Stel, J.H., Wolff, W., Hoogervorst, F., **On the edge of Antarctica: Account of the First Netherlands Antarctic Expedition, winter 1990-1991, under the Ocean Research Foundation** [Op de rand van Antarctica: Verslag van de eerste Nederlandse Antarctica-expeditie in de winter van 1990/1991 uitgezonden door de Stichting Onderzoek der Zee], Leusden, Foto, 1992, 94p., In Dutch. 9 refs.

DLC G850.N43W54

This book, with numerous photographs, includes a detailed account of the progress of the First Netherlands Antarctic Expedition and of the research it carried out on King George I. in 1990-1991. One folded leaf of maps of the area investigated is attached to the inside of the back cover.

D-53138
Høibakk, R., Mørdre, S., **To the South Pole by traverse: Norwegian South Pole expedition, 1990** [Sydpolen på tvers: den Norske Sydpolekspedisjonen 1990], Oslo, Gyldendal Norsk Forlag, 1991, 157p., In Norwegian.

DLC G850.N67H65

After a brief review of previous Norwegian expeditions to Antarctica, and of some geographic and climatological features peculiar to it, details of the South Pole traverse expedition carried out in 1990 are presented. The book is written in two parts, describing the memorable experiences and vivid impressions of the expeditioners. Numerous photographs accompany the text.

D-53188
Aguayo L., A., **31st Chilean Scientific Antarctic Expedition** [XXXI Expedición Científica Antártica del INACH], *Boletín Antártico Chileno,* May 1995, 14(1), p.20-24, In Spanish.

Outlines of 16 projects in various disciplines carried out during the 31st Chilean antarctic expedition, and data on the logistic support for the expedition provided by the Army and Navy of Chile, are presented.

D-53475
Étienne, J.L., Avérous, P., ***Erebus* expedition** [Expédition Erebus], Arthaud, 1994, 192p., In French. Refs. p.189.

DLC Q115.E85

An account is given, with numerous photographs and illustrations, of the 1993-1994 French expedition to Mount Erebus, including the description of the ship *Antarctica,* which carried the expeditioners across the austral ocean. Also described are the history and characteristics of the volcano and the details of the expeditioners' ascent.

D-53635
Filchner, W., **To the sixth continent: the Second German South Polar Expedition,** Huntingdon and Norfolk, UK, Bluntisham Books and Erskine Press, 1994, 253p., Translation, introductory matter, and editing by W. Barr. 64 refs.

DLC G850 1911.D48F5513 1994

This is a translation of the report Filchner prepared following the 1912 German expedition to the Weddell Sea. Due to the intervention of World War I, the report was not published until 1922, in Berlin. From a scientific viewpoint, the expedition is regarded as a success because of the wealth of observations that was compiled in a number of scientific and technical areas. From the personnel aspect, however, the rancor that developed between Filchner and Richard Vahsel, the first Captain of the Expedition ship *Deutschland,* led to the rise of two bitterly opposing factions, each blaming the other for the multiple problems which beset the Expedition. The translator provides a brief history of the exploration of Antarctica and sets this Expedition in relation to the endeavors of Amundsen and Scott, concurrently under way in the Ross Sea region. Additionally there is included a compact, comprehensive biography of Filchner covering his early life and training and recounting his activities after the Expedition.

D-53638

Karlqvist, A., Carlsson, M.L., **Swedish Antarctic Research Programme 1990/91, South Georgia: a cruise report,** Stockholm, Swedish Polar Research Secretariat, 1991, 97p., PB95-222 147, Refs. passim.

The Swedish expedition to South Georgia during the austral summer 1990-91 was an initial step in a cooperative arrangement with the British Antarctic Survey (BAS) to promote and foster Swedish-British collaboration in polar research. It was a reconnaissance expedition, the main purpose of which was to lay the ground for future research activities. (Auth.)

D-54033

Kattner, G., ed, Fütterer, D.K., ed, **Expedition ANTARKTIS XII of RV *Polarstern* in 1994/95. Report of Legs ANT XII/1 and 2** [Die Expedition ANTARKTIS XII mit FS *Polarstern* 1994/95 Bericht von den Fahrabschnitten ANT XII/1 and 2], *Berichte zur Polarforschung,* 1995, No.168, Bremerhaven, Germany, Alfred-Wegener-Institut für Polar- und Meeresforschung, 1995, 100p., Expedition Leg 1, Bremerhaven to Punta Arenas in English; Leg 2, Punta Arenas to Cape Town, via the South Shetland and South Orkney Islands, antarctic waters, and Antarctica; in German. Refs. passim.

Only ANT XII, Leg 2, in the antarctic sphere of interest, is highlighted here. The report for this leg comprises a set of mostly brief accounts along the ship's line of travel from Punta Arenas to Cape Town, with short periods of investigations at Elephant Island, King George Island, Atka Iceport, and in the SE Weddell Sea. Areas of particular interest include: the weather; numerous small marine creatures; UV radiation effects; en route physical oceanography; and the key role of the Shackleton Range in the geology of West Antarctica and the SWEAT hypothesis.

See also:
A-52302 A-53513 E-52861 G-52043 G-52859 G-52860 H-53865

E. GEOLOGICAL SCIENCES

E-51656

Egorov, L.S., Mel'nik, A.IU., Ukhanov, A.V., **First discovery of kimberlite with syngenetic schlieren of calcitic carbonatite from a dike in Antarctica** [O pervoĭ nakhodke daĭkovogo kimberlita s singeneticheskimi shlirami kal'tsitovogo karbonatita v Antarktide], *Akademiia nauk. Doklady,* Jan. 1993, 328(2), p.230-233, In Russian. 5 refs.

Among the findings were the following 5 points: 1. The matrix rock of the dike is almost completely free of xenogenetic mantle material, the magmatic ingredient of kimberlite. 2. Phase separated globules of flat-granular calcite in the dike are identical in morphology and location in the stratified matrix to the products of the thin immiscible experimentally studied silicate-salt solutions. 3. The dike demonstrates the coexistence of primary-magmatic (flat-granular) and metasomatic (microgranoblastic, poikilitic-blastic and dendritic) calcite in one rock. 4. The described example demonstrates the relation of the kimberlite-forming fluid of parent magma to ijolite-carbonatite complexes. 5. The close spatial proximity of Benfontein kimberlite sills to high diamond-bearing pipes also makes a workable analogous association for a similar petrographic dike in East Antarctica. (Auth. mod.)

E-51657

Alekseev, V.A., **Preatmospheric mass distribution of antarctic and non-antarctic meteorites,** *Solar system research,* July 1994, 28(1), p.38-43, Translated from Astronomicheskii vestnik. 29 refs.

The mass distributions of conventional chondrite type antarctic and non-antarctic meteorites are compared. The mean mass of the non-antarctic bodies is approximately two orders of magnitude greater than that of the antarctic ones, which may be the result of differences in collection and weathering conditions. By analyzing the distribution of neon isotopes it was concluded that the preatmospheric antarctic and non-antarctic conventional chondrites might have similar mass distributions, and that bodies which fell to the earth about 10^4-10^5 yr ago (that being the mean terrestrial age of antarctic meteorites) and those falling in the present era may stem from a single source. (Auth. mod.)

E-51664

DiVenere, V.J., et al, **Geological investigations in eastern Marie Byrd Land, West Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.5-6, 9 refs.

The purpose of these investigations was to develop an understanding of the evolution of the Pacific margin of the Gondwana supercontinent, particularly the relationship of Marie Byrd Land with the remainder of West Antarctica, New Zealand, and the east antarctic craton, through field and laboratory studies of the pre-Cenozoic rocks of Marie Byrd Land during the 1992-93 season. Comparison of the 100- to 110-m.y. paleomagnetic poles for Marie Byrd Land (MBL 100) and Thurston I. (TI 110) with a synthetic apparent polar wander path for the east antarctic craton indicates that there has been significant motion of West Antarctica (at least Marie Byrd Land and Thurston I.) with respect to East Antarctica since about 100 mya.

E-51665

Wilch, T.I., McIntosh, W.C., Panter, K.S., Dunbar, N.W., **Preliminary report on field investigations and ^{40}argon/^{39}argon geochronology of the Crary Mountains volcanoes, Marie Byrd Land, West Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.7-9, 4 refs.

A field party of 4 geologists mapped and sampled volcanic outcrops in the Crary Mountains, Marie Byrd Land, during the 1992-93 austral summer field season as part of the west antarctic volcano exploration (WAVE II) project. The study objectives include the following: to characterize the volcanic geology by field mapping, particularly to document and date radiometrically past magma-ice interactions; to build upon preliminary age and geochemical data from previous studies so as to develop a more thorough description of the volcanic evolution of the Crary Mountains; and to place the petrogenesis of the Crary Mountains in the broader context of Marie Byrd Land volcanism. This article summarizes field observations and presents new ^{40}Ar/^{39}Ar laser fusion dates from five samples.

E-51666

Luyendyk, B.P., Smith, C.H., **Geological expedition to King Edward VII Peninsula and the Ford Ranges, Marie Byrd Land,** *Antarctic journal of the United States,* 1993, 28(5), p.10-13, 19 refs.

The Edward VII Peninsula is a largely ice-covered domal feature containing the sparsely exposed and widely separated rock outcrops of the Rockefeller and Alexander Mountains and outlying nunataks. The primary objectives for the 1992-93 season on Edward VII Peninsula were to extend gravity coverage over apparent gravity features detected in an earlier survey; to obtain samples for paleomagnetic study to augment existing data from the northern Ford Ranges in Marie Byrd Land; and to explore the relationship between the Fosdick Metamorphic Complex of northern Marie Byrd Land and the Alexandra Complex of Edward VII Peninsula. Ancillary observations of glacial and volcanic features in the northern Ford Ranges were also made.

E-51668

Hart, S.R., Kyle, P.R., **Geochemistry of McMurdo Group volcanic rocks,** *Antarctic journal of the United States,* 1993, 28(5), p.14-16, 7 refs.

Young Cenozoic volcanic rock from Marie Byrd Land and from Scott and Balleny islands are unusual because they show ^{87}Sr/^{86}Sr ratios lower than most oceanic island basalts, some values approaching those typical of mid-ocean ridge basalt (MORB). To assess the geographic extent of this low ^{87}Sr/^{86}Sr province and to decide whether a MORB-type mantle is involved, the authors have analyzed a reconnaissance sampling of basalts from the Hallett volcanic province, northern Victoria Land, for Sr, Nd, and Pb isotopic ratios. These data are shown in a figure; data for basalts from Peter I Island, Jones Mountains, and Marie Byrd Land are included for comparison.

E-51669

Stilwell, J.D., Levy, R.H., Harwood, D.M., **Preliminary paleontological investigation of Tertiary glacial erratics from the McMurdo Sound region, East Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.16-19, 16 refs.

During 1991-92 and 1992-93 austral summer field seasons, several hundred fossiliferous glacial erratics were collected from coastal moraine at Minna Bluff and Mount Discovery in McMurdo Sound, providing a window into previously poorly known Early Tertiary life of East Antarctica. New data from these erratics should continue to expand understanding of the paleobiogeographic history of the Southern Hemisphere biota and how these taxa relate to other Gondwana Realm groups, including those of the Antarctic Peninsula. This paper concentrates on the discovery of molluscan taxa, some believed to be new, and the discovery of wood and leaves preserved within several large sandstone blocks located at Minna Saddle, focusing attention on the Eocene erratics; fossiliferous erratics of Miocene and Pliocene (Scallop Hill Formation) were also collected for future study.

E-51670

Wheelock, M.M., Marsh, B.D., **Bimodal differentiation: silicic segregations in the Ferrar Dolerites,** *Antarctic journal of the United States,* 1993, 28(5), p.19-21, 7 refs.

The upper portions of mafic sills commonly contain pods or lenses of much more silicic rock, resulting from *in situ* differentiation. This strong compositional contrast, without a continuum of intermediate compositions, is a clear and pervasive example of bimodal differentiation. Some of the best exposures of such bimodally differentiated sills are in the Ferrar Dolerites of Victoria Land, which crop out extensively in the McMurdo Dry Valleys region. Observing and documenting the size, distribution, and geometry of the Ferrar silicic segregations was the aim of the Jan. 1993 field season.

E-51671

Grunow, A.M., Encarnacion, J., **Paleomagnetic and geochronologic studies of igneous rocks from southern Victoria Land,** *Antarctic journal of the United States,* 1993, 28(5), p.21-23, 2 refs.

During the 1992 field season, the authors undertook a paleomagnetic and geochronologic sampling program in the basement intrusions of southern Victoria Land. The aim of this research was to obtain new Late Proterozoic(?) and Early Paleozoic paleomagnetic reference poles that would establish an apparent polar wander path for East Antarctica and Gondwana. Paleomagnetic data, along with precise radiometric age constraints, will help determine Antarctica's Early Paleozoic paleogeographic position. The radiometric dating program will better establish the age of the Early Paleozoic igneous activity and provide further constraints on the tectonic setting of this area during and after the Ross deformational event.

E-51673

Wilson, T.J., Braddock, P., Janosy, R.J., Elliot, R.J., **Fault kinematic studies in the Transantarctic Mountains, southern Victoria Land,** *Antarctic journal of the United States,* 1993, 28(5), p.26-29, 21 refs.

Determining the structural development of the Discovery accommodation zone is the principal focus of the ongoing research described here. Structural kinematic analysis of brittle fault and dike arrays is being used to map the displacement patterns along and across the zone. During the 1992-93 field season, brittle fault studies were undertaken at Ferrar Glacier, Radian Glacier, Skelton Glacier, Skelton Névé, the Royal Society Range, and in the Mount Discovery area. Specific scientific objectives and a preliminary summary of results are described for each of the regions covered during the season.

E-51674

Mensing, T.M., Faure, G., Place, M.C., Reed, D.B., **Origin of the moraines between Griffin Nunatak and Brimstone Peak, southern Victoria Land,** *Antarctic journal of the United States,* 1993, 28(5), p.30-31, 3 refs.

During the 1992-93 field season, the Crescent Moraine (informal name) was investigated to determine its origin. For this purpose, a suite of till samples was collected at 1 km intervals along the Crescent Moraine using the global positioning system to establish the coordinates of each site. In addition, a suite of ice samples was collected at 20 m intervals along a surveyed line extending across the moraine to determine the isotope composition of oxygen in the ice. The character of the ice under the moraine was examined in a shallow trench cut across the moraine to detect the presence of sediment embedded in the ice. Only a few scattered streaks of sediment were found in the ice under the Crescent Moraine, however. The pebbles and boulders that make up the Crescent Moraine consist primarily of basalt and dolerite derived from the Kirkpatrick Basalt and the Ferrar Dolerite, respectively.

E-51675

Taylor, T.N., Taylor, E.L., Horner, T., Masood, K.R., **Palynostratigraphy of the Mackellar Formation (Beacon Supergroup), East Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.32-33, 5 refs.

Samples used in this study were collected from three measured sections in the Beardmore Glacier area and are representative of Mackellar sediments in this region. Samples that yielded the highest total organic carbon (TOC) together with low vitrinite reflectance values were selected for palynomorph preparation. Because of the high degree of thermal alteration in many of the Beacon sediments, a relationship between the extent of alteration and proximity to the intrusives was developed to increase the potential recoverability of palynomorphs. A table indicates the various palynomorph taxa described from the Mackellar Formation. Monosaccate grains are the most common element, with azonate triletes and non-taeniate bisaccates also represented in high percentages.

E-51676

Hammer, W.R., Hickerson, W.J., **Brief review of Mesozoic terrestrial vertebrates from the Transantarctic Mountains including evidence of a scavenging theropod,** *Antarctic journal of the United States,* 1993, 28(5), p.33-35, 10 refs.

The most recently discovered vertebrate fauna occurs high in the Falla Formation on Mount Kirkpatrick in the Beardmore Glacier area. This material includes elements of a new crested theropod dinosaur, a prosauropod dinosaur, a pterosaur (flying reptile), and a tritylodont (advanced synapsid). These fossils are apparently Early Jurassic in age, hence represent the youngest Mesozoic vertebrates from the Transantarctic Mountains. Included among the bones collected from Mount Kirkpatrick is a large theropod ischium that shows evidence of gnawing on the distal end.

E-51677

Rowell, A.J., Evans, K.R., McKenna, L.W., III, **Cambrian and possible Proterozoic strata in the Transantarctic Mountains, north of Leverett Glacier,** *Antarctic journal of the United States,* 1993, 28(5), p.35-37, 14 refs.

The Pacific Ocean was initiated by rifting between a conjoined Antarctic/Australia continent and the western margin of Laurentia during Neoproterozoic time. The antarctic sector of the paleo-Pacific margin approximately coincides with the present-day position of the Transantarctic Mountains, but timing of the rifting event that produced this margin is poorly constrained. Furthermore, between Beardmore Glacier and the Pensacola Mountains, only reconnaissance-level information on the subsequent Cambrian stratigraphic and tectonic history exists. The principal objective of the 1992-93 field season was to provide needed information for the central part of the Transantarctic Mountains in the Harold Byrd and Bender mountains, north of Leverett Glacier. Specifically, the goal was to document the Proterozoic and Cambrian geological history of the region and collect samples for subsequent isotopic, geochemical, and paleontological laboratory study. Two results of the fieldwork are discussed. First, the authors recognized an Early Cambrian carbonate platform in an area where its existence was unexpected. Second, they consider some of the marbles and schists initially included in the upper part of the Middle Cambrian Leverett Formation to be significantly older, possibly of Neoproterozoic age.

E-51678

Fleming, T.H., Foland, K.A., Elliot, D.H., **Direct dating of mid-Cretaceous alteration of the Kirkpatrick Basalt in northern Victoria Land: ^{40}argon/^{39}argon and rubidium/strontium ages of apophyllite,** *Antarctic journal of the United States,* 1993, 28(5), p.38-40, 19 refs.

Conventional K/Ar ages on whole-rock samples of the basalts in northern Victoria Land range from about 90 to 180 million years. In an effort to establish the age of alteration in northern Victoria Land more definitively, a sample of apophyllite collected from Mount Frustum was studied by ^{40}Ar/^{39}Ar and Rb/Sr dating techniques. The apophyllite, a potassium-bearing hydrous sheet silicate, commonly occurs in vugs and vesicles in the lavas and was precipitated, along with a variety of other minerals including quartz, calcite, stilbite, heulandite, and natrolite, from hydrothermal fluids which passed through the rocks. The apophyllite has a very high Rb/Sr ratio, as illustrated in a figure. As a result, an Rb/Sr model age can be derived from the present-day isotope compositions by assuming that strontium incorporated into the apophyllite had a ^{87}Sr/^{86}Sr ratio similar to its host basalt (approximately 0.710). The date calculated in this manner is 94 m.y. and is insensitive to any reasonable values chosen for the initial ratio of ^{87}Sr/^{86}Sr incorporated into the apophyllite.

E-51679

Redfield, T.F., Fitzgerald, P.G., Roberts, M., **Fission-track**

investigations of lithotectonic history: northern Victoria Land, 1993, *Antarctic journal of the United States,* 1993, 28(5), p.41-42, 9 refs.

During the 1991-92 field season, a field party collected fission-track samples from northern Victoria Land to identify the presence or absence of an older uplift/denudation event. Severe weather and logistical problems precluded a sampling effort beyond the primary objective, Mount Adam (4,010 m). During the latter third of the 1992-93 field season, the authors were able to use the U.S. Coast Guard cutter *Polar Sea* to conduct helicopter-supported fission-track sampling traverses near Terra Nova Bay, to enlarge their database and link existing data from southern and northern Victoria Land. A map shows the division of the Transantarctic Mountains north of McMurdo Sound into three crustal blocks. It is suggested that the crustal blocks constituting the Transantarctic Mountains may operate on a semi-independent basis, each block upwarped and supported by a local crustal root. This flexural isostasy, and the consequent lithospheric rigidity, may possibly be what has maintained the aseismic Transantarctic Mountains in the absence of lateral buttressing in an actively extensional environment for at least 55 m.y.

E-51680
Fitzgerald, P.G., Redfield, T.F., Goldstrand, P.M., Hobbs, C., **Geologic and fission-track studies in the Heritage Range, Ellsworth Mountains, and nunataks of West Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.43-46, 16 refs.

A vertical sampling profile on the Vinson Massif in the southern Sentinel Range of the Ellsworth Mountains indicates that the mountains were denuded at least 4 km in the early Cretaceous following the initial separation of East and West Gondwana and the opening of the Weddell Sea. The data did not reveal the timing of initiation of this denudation but apatite fission-track age analysis on a sample of Crashsite Group quartzite from Springer Peak suggested that the initiation of this denudation event may be found in the Heritage Range. To test this hypothesis, the authors visited the Heritage Range in Nov. and Dec. 1992. Samples of Jurassic granite were also collected from the Whitmore Mountains and Pirrit Hills in late Dec. 1992 and early Jan. 1993. Fission-track data from the Ellsworth Mountains and other ranges of Ellsworth-Whitmore Mountains crustal block will help to further constrain not only the uplift and formation of these mountains but also the tectonic evolution of West Antarctica during, and subsequent to, the break-up of Gondwana.

E-51681
Feldmann, R.M., **Fossil mole crabs from Late Cretaceous rocks on James Ross Island, Antarctic Peninsula,** *Antarctic journal of the United States,* 1993, 28(5), p.46-48, 4 refs.

In the austral summers of 1985-86 and 1987-88, the British Antarctic Survey made extensive collections of Late Cretaceous marine fossils in James Ross Basin. Fossil crabs and lobsters, decapod crustaceans, were collected. The purpose of this paper is to comment on one of the more unusual members of that fauna, *Retrorsichela laevis* Feldman, Tshudy, and Thomson, and to speculate on its ecological significance.

E-51682
Elliot, D.H., **Geologic studies at Cape Wiman, Seymour Island,** *Antarctic journal of the United States,* 1993, 28(5), p.48-49, 5 refs.

Geologic fieldwork was conducted during Jan. and the first few days of Feb. 1993 on Seymour I. The field program continued earlier investigations on the stratigraphy and sedimentary petrology of the Lower Tertiary beds. The intent had been to map in detail the Paleocene beds at Cape Wiman and their contact with the Eocene La Meseta Formation as well as the Paleocene Cross Valley Formation and its contacts with the López de Bertodano, Sobral, and La Meseta formations in Cross Valley. Because of poor weather conditions, only the first objective was met.

E-51683
Askin, R.A., **Palynology of an olistostrome at Cape Wiman, Seymour Island,** *Antarctic journal of the United States,* 1993, 28(5), p.49-50, 6 refs.

The current palynological study of the Eocene La Meseta Formation on Seymour I., northeastern Antarctic Peninsula, includes recent examination of 39 samples. These samples were collected during several expeditions to Seymour I., the most recent being the 1992-93 field season of the Argentine Antarctic Program. The units of interest are valley fill deposits constituting the basal La Meseta Formation at Cape Wiman, northern Seymour I. The samples include both matrix and rafted blocks of an olistostrome (formed by soft sediment slumping, in this case off steep valley walls) at the base of the formation and from a second thinner olistostrome unit higher in the section, as well as samples of lower La Meseta strata.

E-51696
Crame, J.A., **Evolutionary history of Antarctica,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.188-214, 98 refs.
DLC G845.5.A54 1994

One of the most significant developments in antarctic earth science over the last 30 years has been the improvement in the knowledge of the continent's fossil record. It is now possible, for the first time, to distinguish the broad outlines of the history of life on the southernmost continent; thus Antarctica has become another valuable reference point for global palaeobiological syntheses. Analysis of the profilic antarctic fossil record over the last 600 million years shows that Early Palaeozoic (Cambrian) marine fossils have tropical/subtropical affinities, but almost all subsequent faunas and floras are of temperate aspect. Indeed it is becoming apparent that, ever since Antarctica achieved a mid- to high-latitude position in the Southern Hemisphere, it has been the site of differentiation of distinct austral biotas. To account for the persistent development of distinct high-latitude biotas over considerable periods of geological time, three simple global models have been developed. In the first of these the polar regions are regarded as refugia; that is, they are sites of accumulation of taxa which have been displaced over time from lower latitudes. In the second model, the polar regions are regarded as major centers of origin. The third model emphasizes times when the ranges of formerly widespread ancestral taxa were split in the low-latitude regions to form bipolar patterns.

E-51697
Tessensohn, F., **Geological contributions from Antarctica,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.215-228, 26 refs.
DLC G845.5.A54 1994

There are three main reasons why Antarctica has to be considered in any global geo-inventory: it is a true continent as indicated by a thick continental crust, a high average elevation, and rocky coasts and interior mountain ranges; it has been the central piece of Gondwana, and the antarctic plate is one of seven major plates which make up the solid shell of the Earth. The sedimentary archives of the Antarctic contain three sets of important climatic information with different time-scales and resolution. A long-term climatic record (170 m.y.) is contained in the Gondwanan sediments and includes information on a period of coal formation and major glaciation. The medium-term climatic record (25 m.y.) is preserved in the sediments of the marine basins and informs us on the preglacial and early glacial climatic periods. Finally, the short-term record on the order of up to 200,000 years can be found in the inland ice and in lake sediments. It provides the history of the recent glacial period and the climatic background for possible human-induced changes. The processes of plate construction and destruction can best be studied in certain key areas which are present in Antarctica: the continental split in the Ross Sea rift; the mid-oceanic ridges in the oceans surrounding Antarctica; an active island arc in the volcanic South Sandwich Is.; and cordilleran-type subduction-related mountains in the Antarctic Peninsula.

E-51704
Wharton, R.A., Jr., Meyer, M.A., McKay, C.P., Mancinelli, R.L., Simmons, G.M., Jr., **Sediment oxygen profiles in a super-oxygenated antarctic lake,** *Limnology and oceanography,* June 1994, 39(4), p.839-853, 37 refs.

Perennially ice-covered lakes are found in the McMurdo Dry Valleys of southern Victoria Land. In contrast to temperate lakes that have diurnal photic periods, antarctic (and arctic) lakes have a yearly photic period. An unusual feature of the antarctic lakes is the occurrence of O_2 at supersaturated levels in certain portions of the water column. Here the authors report the first sediment O_2 profiles obtained using a microelectrode from a perennially ice-covered antarctic lake. Sediment cores collected in Jan. and Oct. 1987 from Lake Hoare in Taylor Valley show oxygenation down to 15, and in some cases, 25 cm. The oxygenation of sediments several centimeters below the sediment-water interface is atypical for lake sediments and may be characteristic of perennially ice-covered lakes. There is a significant difference between the observed Jan. and Oct. sediment O$_2$ profiles. Several explanations may account for the difference, including seasonality. A time-dependent model is presented which tests the feasibility of a seasonal cycle resulting from the long photoperiod and benthic primary production in sediments overlain by a highly oxygenated water column. (Auth. mod.)

E-51706

Krylov, D.P., Ustinov, V.I., **Conditions of the formation of the Archean charnockites of Aker Peaks (Napier complex, East Antarctica) based on rock composition and oxygen-isotope data,** *Geochemistry international,* Aug. 1994, 31(8), p.13-23, Translated from Geokhimiia. 31 refs.

Two charnockite generations Ch$_1$ and Ch$_2$ are distinguished in the Napier complex of East Antarctica. Ch$_1$ crystallized from granitic magmas at low water pressures, while Ch$_2$ generation involved the replacement of orthopyroxene by phlogopite in the initial Ch$_1$ rocks, together with silica loss and substantial reduction in *delta*^{18}O, which occurs especially in the restite rims around the Ch$_1$ relicts. The distribution for most of the main elements agrees with the conservation condition Ch$_1$ + restite = Ch$_2$ with large degrees of melting (0.8-0.9). The *delta*^{18}O depletion was due to Rayleigh distillation during rapid segregation of a melt. Such conditions suggest rise in H$_2$O activity on account of buffer reactions, which may have been the reason for the diatexis and the formation of the late-generation charnockites. (Auth. mod.)

E-51707

Egorov, L.S., **Petrogeochemical and petrogenetic features of hypabyssal alkali ultrabasites in the Jetty Oasis polzenite-alkali picrite complex, Prince Charles Mountains, East Antarctica,** *Geochemistry international,* Aug. 1994, 31(8), p.24-40, Translated from Geokhimiia. 17 refs.

New data are used in a brief characterization of the geology, petrography, and petrogeochemistry of an East Antarctic hypabyssal alkali-ultrabasic complex. Three successively formed rock groups are described amongst the small stocks, sills, and dikes: (1) rushayite tuffisite breccias, (2) polzenites, and (3) alkali picrites and olivine melanephlinites, which contain deep-seated peridotite xenoliths of the spinel and pyrope facies. Sub-solidus autometasomatic phlogopitization has resulted in the primary K-Na alkalinity in some of these rocks being replaced by potassic alkalinity; the probability of a similar origin for the elevated potash in kimberlites is pointed out. The absence of a relationship between surface volcanism and the lamprophyre, kimberlite, and lamproite diatremes (explosion pipes) is explained. (Auth. mod.)

E-51726

Yu, S.H., et al, **Elemental geochemical characteristics of Late Quaternary rock core from Yanwo Lake in the Great Wall Station area, King George Island, southwest Antarctica,** *Antarctic research,* June 1994, 5(1), p.44-51, 9 refs. For Chinese original see 21E-48117.

Reported in this paper are the contents, distribution, statistical values, relative rich coefficients and interrelated matrix of elements in Late Quaternary sediments of a core from Yanwo Lake at the Great Wall Station. Results show that the lam (clayey soil) is very rich in Cs, As and Ba, and poor in Cr and Hf; the sand is rich in Ni, Zn, Au and Sr, and poor in Ta, Zn and E; and the gravel is rich in Rb and poor in Fe, Cs, Th, As and Ba. The relative rich coefficients of the elements in the Yanwo Lake core crust, sedimentary rock and loess show that K, Rb, Cs, Ta, Hf, U, Th, Zn, Sr and Ba have great movable ability; Na, Fe, Co, Zr, Sc and As have median movable ability; and Ni, Mo and Au have weak movable ability. (Auth. mod.)

E-51729

Zheng, X.S., Sàbat, F., Casas, J.M., Pallàs, R., **Geology and volcanic activities in Hannah Point, Livingston Island, South Shetland Islands, West Antarctica,** *Antarctic research (Chinese edition),* June 1994, 6(2), p.1-12, In Chinese with English summary. 9 refs.

Based on detailed geological mapping and petrographical study, the volcanic sequence and volcanic activities at Hannah Point, Livingston I. are described and discussed. The measured cross-section consisting of interbedded volcaniclastic rocks and lavas is divided into 3 volcanic cycles formed in 3 different stages of volcanism. The unconformity between cycle 1 and 2 records a relatively long intermission of eruptions between the first 2 stages of volcanism. The dacitic to rhyolitic lava and tuff-breccias of the first cycle were formed at the end phase of the eruption. The second stage includes 3 intermittent eruptive activities. The volcanism in the third stage is more intense and differs greatly from that in other stages, both in geology and petrography. The fact that dykes and sills are concentrated in the lower part of the second stage volcanism, and that strong zeolitization developed in the tuffaceous rocks at the two sides of unconformity, suggests a weaker zone near the contact between two cycles, where structural activity and alteration easily occurred. (Auth. mod.)

E-51730

Chen, Y.H., Sears, D.W.G., Wang, D.D., **Inspiration from study of antarctic meteorites. IV. Thermoluminescence studies of antarctic meteorites,** *Antarctic research (Chinese edition),* June 1994, 6(2), p.13-31, In Chinese with English summary. Refs. p.28-30.

Relative to non-antarctic meteorites, antarctic meteorites have lower levels of natural thermoluminescence (TL) due to their large terrestrial ages. Some meteorites (15%) have especially low natural TL, suggesting that they have recently been reheated. These may have come to earth on orbits with particularly small perihelion (<0.8 AU). The TL sensitivity of ordinary chondrites reflects the abundance and nature of feldspar. Shock heating not only decreases the level of natural TL in meteorites, but also destroys the TL phosphor resulting in a decrease in the TL sensitivity of meteorites. The measurement of TL sensitivity has produced new means of classification for 3 types of ordinary chondrites; CO, CV chondrites and eucrites. The peak temperature and peak width of the induced TL curve are also related to the thermal history of the meteorites. Relative to disordering of feldspar, which is the TL phosphor, they increase with increasing metamorphism, so these parameters can be used to obtain an estimate of the metamorphic equilibration temperatures. New TL research data on meteorites have been used to discuss the ejection of the shergottites from Mars, earth-moon transit times, weathering of antarctic meteorites and possible differences in extraterrestrial sources. (Auth. mod.)

E-51745

Wang, Y.B., et al, **Geochemical characteristics and medium pressure granulite facies metamorphism of mafic granulite rocks from the Larsemann Hills, East Antarctica,** *Antarctic research (Chinese edition),* Sep. 1994, 6(3), p.1-11, In Chinese with English summary. Refs. p.10-11.

Oriented distributed mafic granulite lenses, pods and boudins occur in metapelitic leucogneiss in the Larsemann Hills. The geochemical characteristics of the rocks imply that they are chemically similar to mafic cumulate. They probably represent remnants of mafic dykes. In the Mirror Peninsula, orthopyroxene-plagioclase symplectites around garnet in mafic granulite are found. Average pressure calculation on the assemblage indicates the prevailing conditions to be 6.3 +/- 0.5 kbar at 747 +/- 48 C, which is the first pressure estimate in the light of the equilibrium assemblage garnet-orthopyroxene-plagioclase-quartz. An earlier medium pressure granulite facies event in the Larsemann Hills is confirmed. (Auth. mod.)

E-51752

Del Ben, A., et al, **Seismic study of the structure, stratigraphy and evolution of the Ross Sea (Antarctica),** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.9-106, Refs. p.99-106.

On the basis of a large dataset of seismic lines performed by Italian geophysical expeditions, the regional structure and stratigraphy of the Ross Sea Embayment area in Antarctica have been reconstructed. The tectonic and seismostratigraphic conditions of the explored area are illustrated by numerous interpreted seismic line examples distributed on all the most important existing regional features. Three seismic horizons have been interpreted and mapped over the whole Ross Sea area investigated. Four other useful horizons have been locally identified and are given in specific figures to show the sedimentary cycles of the area. Isopach of the total sedimentary cover is also presented as a useful document for basin analysis and evaluation of the tectonically controlled deposition. The deformation pattern of the whole Ross Sea region seems to indicate that the lithospheric stretching is due to a general transtensive process with the creation of combined distensive and strike-slip faults. From seismic exploration of the basement, a total cumulative elongation of about 130 km (from an initial 830 km to a final 960 km) for all three phases has been calculated. Special processing with an innovative dereverberation technique showed a clear Moho discontinuity signal on a seismic line crossing the Coulman High. (Auth. mod.)

E-51753

Brancolini, G., et al, **Geophysical study of the Ross Sea (Antarctica): two integrated sections,** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.107-117, 10 refs.

Some multichannel seismic lines recorded by the Osservatorio Geofisico Sperimentale (OGS) of Trieste during the 1987-88 cruise in the Ross Sea on behalf of the Italian "Programma Nazionale di Richerche di Antartide" (PNRA) are displayed, together with gravity and magnetic data to obtain two geological sections, in an attempt to present the general framework of the Ross Sea region. The first section has a south-north trend and crosses the Victoria Land Basin and the Ross continental slope. The second has an east-west trend and crosses the Eastern Basin and the Central Trough. The structural configuration of the area is typical of a rifted passive margin. The rifting stopped before the break-up of the continental crust and the formation of the oceanic floor. (Auth.)

E-51754

Boehm, G., et al, **Integrated interpretation of geophysical anomalies in the western Ross Sea (Antarctica),** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.119-132, 13 refs.

In this paper, a seismic and magnetic profile recorded in the Western Ross Sea near Coulman I. is analyzed. The seismic line is characterized by some buried structures whose origin is not fully understood. Automatic bidimensional velocity analysis and tomographic inversion, as well as inversion of the magnetic data over the examined profile, were performed. Analysis of the velocity field identified a local inhomogeneity whose depth is comparable to that of the seismic structure. A quantitative analysis of the magnetic data, on the other hand, supports the presence of magmatic bodies whose depths and shapes are in fairly good agreement with the structure and the velocity inhomogeneity. The authors conclude that the observed structures are due to magmatic intrusions (sills and dikes) which caused the deformation of the upper sedimentary sequences and the consequent anticlinal structure, successfully remodelled by the erosional action of the antarctic glaciers. (Auth.)

E-51755

Busetti, M., De Santis, L., Kavun, M.M., Zayatz, I., **Seismic sequences of the Ross Sea continental margin (Antarctica),** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.133-152, 23 refs.

Thick sedimentary sequences occur under the continental margin of the Ross Sea. MCS lines collected in the Ross Sea since 1987 by OGS-Trieste, Italy and MAGE-Murmansk, Russia have been used to correlate the main unconformities and the major depositional patterns ranging in age from at least Late Oligocene to the present. The unconformity U5 has been identified as a continuous reflector from the eastern to northwestern Ross Sea margin. Reflectors correlated with the U6, U5A, U4A, U4, U3, U2, and U1 unconformities show lateral continuity but are not present everywhere in the Ross Sea. Aggradation sequences occur below U5 on the northwestern and eastern Ross Sea margin, while a prevailing progradational pattern with substantial advance of the shelf break occurs in the more recent sedimentary sequences. All the unconformities seem to be controlled by glacial erosion and tectonics. The beginning of progradation is related to the onset of major glacial expansion which prevented the preservation of most of the thin interglacial sedimentary sequences. The greater sediment thickness and greater advance of the shelf break in the eastern Ross Sea suggest a different ice flow pattern on the two sides of the Ross margin. (Auth.)

E-51756

Gantar, C., Marchi, M., Sinceri, R., Vidmar, R., **Geophysical data processing in the Ross Sea (Antarctica),** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.153-171, 12 refs.

The procedures adopted by OGS, Trieste in processing the navigation and geophysical data acquired during expeditions in Antarctica are illustrated and commented on. The quality of the results appears consistent with the state-of-the-art and well suited to their interpretation in terms of geology and tectonics. (Auth.)

E-51759

Marchetti, A., et al, **Sea bottom morphologies of the Ross Sea area (Antarctica),** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.203-218, 21 refs.

During the 1987-88, 1988-89, 1989-90 and 1990-91 summers, multichannel seismic reflection, gravity and magnetic surveys in the Ross Sea were recorded and processed by the Osservatorio Geofisico Sperimentale (OGS) of Trieste. Some of the most evident morphological features of the sea bottom in the Ross Sea and their spatial distribution are identified and investigated in this paper, together with an analysis of the general glacial, morphological and sedimentary patterns of the area. Data collected by other investigators using sparkers, side-scan sonars and sub-bottom profilers are also considered. The classification of the features is based on an assemblage of morphogenetically related elements and their geometric relationships. (Auth.)

E-51762

Busetti, M., et al, **Ross Sea (Antarctica): a review of the geological and geophysical exploration,** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.245-263, Refs. p.260-263.

A descriptive overview of recent geological and geophysical findings in the Ross Sea area is presented. After a brief reference to the Gondwana continent break-up, the authors divide geological themes between land geology and marine geology. A list of pertinent references is provided. (Auth.)

E-51772

Takeda, H., Mori, H., Hiroi, T., Saito, J., **Mineralogy of new antarctic achondrites with affinity to Lodran and a model of their evolution in an asteroid,** *Meteoritics,* Nov. 1994, 29(6), p.830-842, Refs. p.841-842.

Five new antarctic achondrites, MacAlpine Hills (MAC) 88177, Yamato (Y)74357, Y75274, Y791491 and Elephant Moraine (EET)84302 were studied by mineralogical techniques to gain a better understanding of the mineral assemblages of a group of meteorites with an affinity to Lodran (stony-iron meteorite) and their formation processes. This group is being called lodranites. These meteorites contain major coarse-grained orthopyroxene (Opx) and olivine as in Lodran and variable amounts of FeNi metal and troilite etc. MAC88177 has more augite and less FeNi than Lodran; Y74357 has more olivine and contains minor augite; Y791491 contains in addition plagioclase. EET84302 has an Acapulco-like chondritic mineral assemblage and is enriched in FeNi metal and plagioclase, but one part is enriched in Opx and chromite. The EET84302 and MAC88177 Opx crystals have dusty cores as in Acapulco. EET84302 and Y75274 are more Mg-rich than other members of the lodranite group, and Y74357 is intermediate. Since these meteorites all have coarse-grained textures, similar major mineral assemblages, variable amounts of augite, plagioclase, FeNi metal, chromite and olivine, the authors suggest that they are related and are linked to a parent body with modified chondritic composition. The variability of the abundances of these minerals is in line with a proposed model of the surface mineral assemblages of the S asteroids. (Auth. mod.)

E-51773

Miyamoto, M., Zolensky, M.E., **Infrared diffuse reflectance spectra of carbonaceous chondrites: amount of hydrous minerals,** *Meteoritics,* Nov. 1994, 29(6), p.849-853, 36 refs.

Infrared diffuse reflectance spectra (2.53-25 microns) of some carbonaceous (C) chondrites, including antarctic meteorites, were measured. The integrated intensity of the absorption bands near 3 microns caused by hydrous minerals was compared with the modal content of hydrous minerals for the meteorites. The CM and CI chondrites show larger values of the integrated intensity than those of the unique C chondrites Y82162, Y86720 and B7904, suggesting that the amount of hydrous minerals in the CM and CI chondrites is larger. This supports the contention that hydrous minerals were dehydrated by thermal metamorphism in the unique chondrites. Orgueil (CI) has the largest value of the integrated intensity among the C chondrites measured, and shows a sharp absorption band at 3685/cm (2.71 microns) that is not seen in the spectra of the CM chondrites. There is an excellent correlation between the observed hydrogen content in C chondrites and the integrated intensity. The CM chondrites show a wide variation in the strength of absorption bands at 1470/cm (6.8 microns), despite the similarity in absorption features near 3 microns for all CM chondrites. The 1470/cm band could be due to the presence of some hydrocarbons but may also be a result of terrestrial alteration processes. (Auth.)

E-51785

Harvey, R.P., Schutt, J.W., **Meteorite recovery and reconnaissance in the Allan Hills—David Glacier region, 1992-1993,** *Antarctic journal of the United States,* 1993, 28(5), p.51-52.

The goal for the 1992-1993 American antarctic search for meteorites (ANSMET) field season was systematically to collect meteorites from the David Glacier and 4 other icefields. In addition, the Reckling Moraine icefield was to be revisited to complete research and reestablish a local survey grid using global positioning system techniques. A total of 257 meteorites were collected, including several unusual specimens. Among these were an iron and a mesosiderite from the NIP, several interesting achondritic meteorites, and many others, listed in a table.

E-51786

Benoit, P.H., Sears, D.W.G., **Thermoluminescence profiles in meteorite finds, climatic change, and ice thicknesses in the Allan Hills, Antarctica, during the Quaternary,** *Antarctic journal of the United States,* 1993, 28(5), p.52-54, 12 refs.

The natural thermoluminescence (TL) level of a meteorite reflects both its terrestrial age and its thermal history. In this paper, the authors examine terrestrial thermal profiles for a single meteorite and discuss the implications of these data for the icefield on which it was found. Meteorite ALHA78084 was used in this study. It was found on the Allan Hills Mid Western Icefield by an American antarctic search for meteorites (ANSMET) expedition in 1978. Two interpretations of the present data, in terms of glaciological history of the region, are possible: the ice thickness in this portion of Antarctica has not been great enough over at least the last 100,000 years to eliminate the Allan Hills Mid Western Icefield, or the ice velocity within the field was not great enough to carry the meteorite away during this time interval. It is concluded that the ice thickness in this region has been within a few hundred meters of the present value over the last 100,000 years, despite documented glacial-interglacial cycles during this period in Antarctica.

E-51787

Lipschutz, M.E., **Meteorite studies: terrestrial and extraterrestrial applications, 1993,** *Antarctic journal of the United States,* 1993, 28(5), p.54-56, 11 refs.

Although meteorites fall sporadically all over the Earth and are recovered for study in some cases, Antarctica provides the only sustained and assured source for meteorite recoveries on a regular basis. The 15,000 meteorite fragments recovered to date from Antarctica, representing an estimated 3,800 +/- 1,800 separate impact events, provide a different window of the Earth's sampling of planetary materials than that provided by falls observed elsewhere on Earth. Much of the research conducted this year involved radiochemical neutron activation analysis (RNAA) and atomic absorption spectroscopy to determine part-per-million to part-per-trillion levels of 12 to 15 trace elements in each sample studied. For the period May 1, 1992 to Apr. 30, 1993, the author's group chemically prepared over 300 samples and measured the first 3 of the radionuclides by AMS in almost 650 samples, meteorites, and terrestrial antarctic (and nonantarctic) rock and ice.

E-51788

Rubin, A.E., Kallemeyn, G.W., **Compositional studies of antarctic meteorites,** *Antarctic journal of the United States,* 1993, 28(5), p.56-57, 5 refs.

In the last one and a half decades, approximately 15,000 meteorite specimens representing about 4,000 separate falls have been recovered in Antarctica. Three new chondrite groups (with more than five members each) have been described in recent years, principally on the basis of antarctic samples. The authors have been active in studying all of the new chondrite groups. They use instrumental neutron activation analysis to determine the compositions of 27 elements (with differing geochemical affinities) in meteorite samples; these data are complemented by mineralogical and petrographic studies. An independent avenue of study has been examination of the hypothesis that antarctic H chondrite finds and nonantarctic H chondrite falls differ significantly in composition, hence may belong to separate meteorite populations. Based on the authors' compositional data, there is no reason to conclude that Victoria Land H chondrites and H falls are derived from separate populations.

E-51802

Behrendt, J.C., et al, **Marine magnetic and aeromagnetic evidence for late Cenozoic submarine and subglacial volcanism in the west antarctic rift system,** *Antarctic journal of the United States,* 1993, 28(5), p.87-88, 15 refs.

The magnetic gradiometer survey by the research vessel *S.P. Lee,* and the German Antarctic North Victoria Land expedition-U.S. Geological Survey (GANOVEX-USGS) aeromagnetic surveys over the western Ross Sea continental shelf and adjacent rift shoulder, and over the northwest Ross Ice Shelf, indicate numerous magnetic anomalies in the west antarctic rift system. These are interpreted to be the result of Late Cenozoic magmatism by comparison with anomalies over the exposed Late Cenozoic volcanic rocks.

E-51804

Jennings, A.E., Williams, K.M., Licht, K.J., Andrews, J.T., **Late Glacial and Holocene history of the western Ross Sea: an initial survey of available cores,** *Antarctic journal of the United States,* 1993, 28(5), p.91-93, 6 refs.

Productivity changes, as recorded by phytoplankton in the sediment, may provide information on global changes in Holocene deep-water circulation. Seven cores have been analyzed as part of a preliminary study in the western Ross Sea. The diatom analyses (diatoms per gram) reveal considerable changes within core sections that often have been described as "unchanging" in the core logs. The authors feel that with a concerted dating effort, they can determine variability in surface productivity over the timespan of the diatomaceous sediment by calculating accumulation rates.

E-51805

McGinnis, J.P., et al, **Fracture zone control on continental margin development: multichannel seismic survey along the southern Antarctic Peninsula,** *Antarctic journal of the United States,* 1993, 28(5), p.93-95, 6 refs.

Approximately 6,100 km of multichannel seismic reflection, gravity, magnetics, and swath bathymetry data were acquired along the Antarctic Peninsula during Feb. and Mar. 1991. The survey, conducted aboard the *Maurice Ewing,* was divided into two parts. The northern part focused on the Bransfield Strait and Shetland Trench. The southern part, discussed here, concentrated on the Pacific side of the Antarctic Peninsula. One of the scientific objectives for the southern portion of the survey was to use geophysical observations of the deep crustal structure to determine how convergent tectonics may have contributed to the apparent segmentation of the Antarctic Peninsula. Marine magnetic anomalies show that the crust increases in age away from the margin, a finding that indicates that portions of the original Phoenix plate were subducted beneath the peninsula.

E-51808

Romanek, C.S., et al, **Record of fluid-rock interactions on Mars from the meteorite ALH84001,** *Nature,* Dec. 15, 1994, 372(6507), p.655-657, 25 refs.

Allan Hills (ALH)84001 is the most recently recognized member of a suite of meteorites—the SNCs—that almost certainly originated on Mars. Preliminary studies suggest that it may be older than other martian meteorites, and may hold important clues regarding near-surface processes on Mars and the evolution of the martian atmosphere. Reported here are analyses of the carbon and oxygen stable-isotope compositions of the carbonates that place constraints on their formation conditions. The results imply the presence of at least two chemically distinct carbonates—one Ca, Fe-rich, the other Mg-rich—that are enriched in ^{13}C relative to terrestrial carbonates, consistent with martian atmospheric CO_2 as the carbon source. The oxygen isotope compositions of the carbonates indicate that they precipitated from a low-temperature fluid in the martian crust. Combined with textural and bulk geochemical considerations, the isotope data suggest that carbonate deposition took place in an open-system environment in which the ambient temperature fluctuated. (Auth. mod.)

E-51809

Doubleday, P.A., Tranter, T.H., **Modes of formation and accretion of oceanic material in the Mesozoic fore-arc of central and southern Alexander Island, Antarctica: a summary,** Recent progress in antarctic earth science. Edited by Y. Yoshida et al., Tokyo, Terra Scientific Publishing Company (TERRAPUB), 1992, p.377-382, 16 refs.

The LeMay Group of Alexander I. is an accretionary complex formed by the eastward subduction of proto-Pacific oceanic crust during the Mesozoic. It contains accreted trench-fill sedimentary rocks, accreted oceanic igneous and sedimentary rocks, autochthonous trench-slope sedimentary rocks, and mélange belts. In the center and south of the island Bouguer gravity data show a linear positive anomaly associated with three areas where accreted igneous rocks are exposed, indicating that they form part of a more extensive belt of similar material. Field and laboratory studies of these three areas show that one consists of an accreted ocean-island, one of accreted ocean-floor and trench-fill material, and one of ocean-floor material with a possible ocean-island segment. A study of the deformation and metamorphic history of each of these areas shows that the ocean-island was frontally accreted, but that the ocean-floor sequences were underplated. Microstructures in the latter suggest a progression from independent particulate flow through cataclastic flow, crystal plasticity and pressure solution. (Auth.)

E-51816

Storey, B.C., **Changing face of the late Precambrian and early Paleozoic reconstructions,** *Journal of the Geological Society,* 1993, Vol.150, p.665-668, 31 refs.

The SWEAT hypothesis linking the Southwest US and East Antarctica as conjugate rift margins of a Neoproterozoic continent has led to major revisions of late Precambrian and early Cambrian reconstructions. Geological evidence summarized here supports separation of Antarctica from Laurentia *c.* 750 My ago. A possible link between the break-up of a Neoproterozoic supercontinent and amalgamation of Gondwana during Pan-African times suggests that the Neoproterozoic was a time of rapid tectonic change. This conflicts with those theories that predict regular supercontinental cycles of 500 Ma from the time of disintegration of one supercontinent to its eventual reassembly. (Auth.)

E-51821

Masood, K.R., Taylor, T.N., Horner, T., Taylor, E.L., **Palynology of the Mackellar Formation (Beacon Supergroup) of East Antarctica,** *Review of palaeobotany and palynology,* 1994, Vol.83, p.329-337, 24 refs.

Palynomorphs were recovered for the first time from the Mackellar Formation (Victoria Group, Beacon Supergroup) of East Antarctica. The palynoassemblage is diverse and includes 15 form genera. The assemblage is dominated by radially symmetrical trilete monosaccates and non-taeniate bisaccates. When compared with other palynofloras from Antarctica the Mackellar assemblage is most similar to Kyle's *Parasaccites Zone.* Based on the occurrence of several miospore taxa, the Mackellar palynomorphs suggest biostratigraphic correlation with Stage 2 in Eastern Australia; the Lower Permian (Sakmarian) of the Perth Basin, Western Australia; the Talchir Formation (Lower Permian-Sakmarian) South Rewa Gondwana Basin, India; and the Tobra Formation (Lower Permian-Sakmarian) Western Salt Range, Pakistan. The recovery of palynomorphs from the Mackellar Formation not only increases the biostratigraphic resolution in Antarctica, but increases the probability that other "barren" formations may also contain recoverable palynomorphs. (Auth.)

E-51831

Ramos, M., Aguirre-Puente, J., Costard, E., Ozouf, J.C., **Correlation between heat flux on the ground and permafrost thermal regime near the Spanish Antarctic Station,** International Symposium on Ground Freezing, 7th, Nancy, France, Oct. 24-28, 1994. Proceedings. Ground Freezing 94. Edited by M. Frémond, Rotterdam, A.A. Balkema, 1994, p.395-396, 4 refs.

During the 1991-92 and 1993-94 antarctic summer a turbulent atmospheric parameters measuring device was installed near the Spanish antarctic station (Juan Carlos I Station) at Livingston I. in order to register the exchanged energy flux between the soil and the lower atmosphere. Temporal evolution of freezing/thawing in the active layer of permafrost was also registered using several temperature probes. Based on the energy exchange flux data and the movement of the free boundary in permafrost, the authors examine the active layer's permafrost evolution as a function of the energy change in the soil/atmosphere surface. (Auth. mod.)

E-51839

Maurette, M., Immel, G., Hammer, C., Harvey, R., Kurat, G., Taylor, S., **Collection and curation of IDPs from the Greenland and antarctic ice sheets,** Analysis of Interplanetary Dust Workshop, Houston, May 1993. AIP conference proceedings, No.310, New York, American Institute of Physics, 1994, p.277-289, 28 refs.

Upon melting or sublimating, Greenland and antarctic ice yields a sandy material which is very rich (up to about 10% by weight in the 50-100 micron size fraction) in unmelted and partially melted micrometeorites (called MMs for micrometeorite or IDPs for interplanetary dust particles). These polar micrometeorites are remarkably unweathered despite having lost unknown amounts of soluble sulfates and carbonates and having "accreted" some trace elements during their settling time in the Earth's atmosphere. Although they mainly bear similarities with the rare class of CM and CR chondrites, some of the characteristics of their primary minerals strongly suggest that they are composed of a material not yet represented in meteorite collections. This paper describes improved methods for collecting micrometeorites in Greenland and Antarctica, and ways to study the past variations of the micrometeorite flux over a time scale >200,000 years.

E-51873

Hall, K., **Some observations regarding sorted stripes, Livingston Island, South Shetlands,** *Permafrost and periglacial processes,* July 1994, 5(2), p.119-126, With French summary. 41 refs.

Sorted stripes have long been recognized in the subantarctic and the maritime Antarctic. The cold and wet conditions of these regions, when compared with the drier continent, are ideal for their development. In particular, the frequent low-amplitude, short-duration freeze-thaw cycles of the subantarctic favor the development of miniature sorted forms. The maritime Antarctic, however, with its larger amplitude and longer duration of freeze-thaw cycles, plus the presence of permafrost, exhibits a more frequent occurrence of the larger forms. The Byers Peninsula has an extensive range of sorted features but, despite being situated in the maritime Antarctic and within a permafrost zone, the majority of these features are of the miniature variety. In addition, the sorted stripes exhibit a distinct spatial preference. Their alignment and spatial distribution are not associated with either the sun or the wind, but are a function of the snow cover. (Auth. mod.)

E-51884

Ricci, C.A., ed, Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, Aug. 21-27, 1994, **Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts,** *Terra Antartica,* 1994, 1(2), p.235-480, Refs. passim. For individual papers see A-51886, C-51944, E-51885, E-51887, E-51889 through E-51925, E-51927 through E-51943, E-51946 through E-51960, F-51888, L-51926 and L-51945.

This special issue of Terra Antartica consists mainly of extended abstracts presented at the Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994, by members of the international scientific community to provide Cenozoic geophysical and geological data from studies of the antarctic continental margin. The papers are listed in the general order of the symposium, with ANTOSTRAT project and discipline overviews first, followed by descriptions of studies completed by each of the five ANTOSTRAT regional working groups under the following headings: Antarctic Peninsula and Weddell Sea regions, Ross Sea region, Wilkes Land and Prydz Bay regions, Acoustic stratigraphy of polar and non-polar margins, Onshore-offshore Cenozoic record, and antarctic coring and drilling.

E-51885

Cooper, A.K., Webb, P.N., **ANTOSTRAT project: an international effort to investigate Cenozoic antarctic glacial history, climates, and sea-level changes,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.239-242, 14 refs.

In 1989, the Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) project was conceived by the SCAR Group of Specialists on Cenozoic Paleoenvironment of the Southern High Latitudes. The objectives of the project were to investigate antarctic Cenozoic terrestrial and marine glacial and interglacial histories, and global climate and sea-level fluctuations, using offshore geophysical, geologic, and glaciologic data; combine existing offshore acoustic data of all types and geologic data from five areas of the continental margin (Antarctic Peninsula, Ross Sea, Wilkes Land, Prydz Bay, Weddell Sea) where vast Cenozoic sedimentary units are known; to develop integrated stratigraphic models of the antarctic continental margin that can be compared with other continental margins, and that must be verified by geologic sampling and scientific drilling, to better understand the effect of the antarctic ice sheet on global sea-level and paleoclimate changes; and to promote international cooperation and coordination through scientific collaboration on Cenozoic geologic studies of the antarctic continental margin.

E-51887

Barrett, P.J., **Progress towards a Cenozoic antarctic glacial history,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.247-248, 20 refs.

The broad outline of antarctic glacial history was established almost 20 years ago with an oxygen isotope curve for the Cenozoic era based on measurements of carbonate shells from deep-sea cores from the southern ocean. The curve, which was subsequently supported by further oxygen isotope studies, represents changes in both water temperature and ice volume. Here it is compared in a figure with the eustatic sea level curve of Haq et al. (1987). Some consider the magnitude of their indicated sea level changes to be excessive, but few question the timing of the short term (1 my) sea level events, which are thought to result from variations in global ice volume (=antarctic ice volume prior to 2.4 Ma). The present antarctic ice sheet owes its existence not to the continent's polar position, which it has occupied for the last 130 Ma, but to its thermal isolation. The first stage in cryospheric development began soon after 40 Ma as Australia and Tasmania cleared North Victoria Land, with final isolation taking place only 23 Ma with the separation of South America and the Antarctic Peninsula. (Auth. mod.)

E-51889

Syvitski, J.P.M., **Glacial sedimentation processes,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.251-253, 20 refs.

The type of sediment deposits fronting the marine margin of an ice sheet depends on glaciologic, oceanographic and geologic parameters. The study of glacimarine deposition has often employed two end-member analog environments: temperate tidewater-glaciers of SE Alaska, and floating and polar ice-margins of Antarctica, where little meltwater emanates from the ice sheet and sediment deposition is controlled by formation of diamicton (till) near the grounding line.

E-51890

Ten Brink, U.S., **Tectonic subsidence and the stratigraphy of the antarctic continental margins and intracontinental basins,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.255-257, 31 refs.

This review illustrates the wide variety of possible tectonic and isostatic causes for subsidence, which should be considered in a quantitative analysis of the seismic stratigraphy of antarctic margins and intracontinental basins. Tectonic and isostatic mechanisms in conjunction with eustatic changes are likely to play a significant role in stratal sequence development only during the early glaciation period in all the antarctic margins, and may continue to play a role up to the present time in the Ross Embayment, the Antarctic Peninsula, and northern Victoria Land, which were tectonically active during the late Cenozoic period. The isostatic response to loading and unloading by the ice cap is expected to have little influence on the stratal geometry.

E-51891

Barker, P.F., **Antarctic Peninsula region: tectonic and sedimentary environments,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.259-262, 24 refs.

The Antarctic Peninsula region includes a wider range of tectonic and depositional environments than do the other ANTOSTRAT regions. Accordingly. both the interests of those within the APRWG and the possibilities for examination of the Cenozoic record are more diverse. Here the author presents an overview of one's understanding of these environments. Broadly, three separate margin provinces may be identified, with different geologies and therefore different problems and opportunities. They are outlined in order from west to east, as follows: Pacific Margin, Bransfield Strait and South Shetland Fore-arc, and Powell Basin and S. Orkney Microcontinent. The Antarctic Peninsula region probably contains a more simple, expanded and complete record than most other regions. In addition, the greater range of depositional environments in the Antarctic Peninsula region draws attention to the complementary values of nearby pelagic and hemipelagic, intermediate and abyssal depth sections, less directly linked to glacial and sea-level history but with the likelihood of a more continuous and more dateable record.

E-51892

Bart, P.J., Anderson, J.B., **Glacial history of the Antarctic Peninsula continental shelf,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.263-264, 2 refs.

Single-channel seismic reflection profiles of the northern Antarctic Peninsula's western continental shelf show a wedge of passive-margin strata overlying deformed forearc strata. Plate convergence between the antarctic and Pacific plates caused this deformation. Subduction ceased diachrononously from south to north as segments of a Pacific spreading center collided with the peninsula's trench during the Cenozoic. The wedge of passive-margin sedimentary strata contains evidence for a transition from non-glacial to glacial conditions. The authors estimate that ice sheets expanded from the mountainous peninsula to the outer shelf in the Middle Miocene, ushering in a period of very dynamic changes in ice volume in the region. Evidence of glaciation (seismic unconformities and facies) has been found at over 30 stratigraphic levels.

E-51893

Cunningham, A.P., Vanneste, L.E., **ANTOSTRAT Antarctic Peninsula Regional Working Group digital navigation compilation,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.265-266, 4 refs.

In Jan. 1992, the ANTOSTRAT Antarctic Peninsula Regional Working Group (APRWG) began a compilation of digital navigation data relating to single and multichannel seismic reflection data acquired across or adjacent to the continental margin of the Antarctic Peninsula. These data were initially compiled to facilitate the efficient exchange of shotpoint navigation data and to enable the correlation of individual seismic reflection data sets. A total of 12 participating agencies submitted digital navigation data in preparation for the ANTOSTRAT APRWG Workshop. The APRWG digital navigation compilation is shown in a figure, with a coastline taken from the Antarctic Digital Database (BAS, SPRI & WCMC, 1993). This map provides denser and more extensive coverage of the Antarctic Peninsula continental margin and adjoining areas than has previously been available to individual research groups.

E-51894

Cunningham, A.P., Larter, R.D., Barker, P.F., **Glacially prograded sequences on the Bellingshausen Sea continental margin near 90W,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.267-268, 5 refs.

The British Antarctic Survey has recently carried out a geophysical investigation of the antarctic continental margin bordering the Bellingshausen Sea. Some 1007 km of multichannel seismic (MCS) reflection data were acquired across and adjacent to the antarctic continental margin in the vicinity of 90W. These are the first digital multi-fold seismic reflection data to be acquired across this part of the antarctic continental margin. The authors present a section taken from the common mid-point stack of MCS reflection profile 923-22 which extends across the continental margin in the vicinity of 87W. This profile reveals a wedge of glacially prograded sediments lying beneath the outer continental shelf.

E-51895

Domack, E.W., McClennen, C.E., Manley, P., Ishman, S.E., **Very high resolution stratigraphy of Late Quaternary glacial marine sediments in fjords and offshore basins, Antarctic Peninsula,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.269-270, 5 refs.

During the austral summers of 1990-91 and 1991-92 the authors conducted marine geological and geophysical investigations along the western side of the Antarctic Peninsula and South Shetland Is. High resolution seismic reflection profiles from several basins, including the Palmer Deep, reveal the presence of a prominent reflector found at a depth of 20-30 m subbottom. This reflector lies at the base of a pelagic to hemipelagic section of siliceous mud and ooze and is underlain by a series of ill-defined discontinuous reflectors that extend to an additional 10 m in depth. There is some evidence of truncation of underlying units at the base of this prominent reflector. Extrapolation of sedimentation rates from 9 m-long piston cores indicates that the prominent reflector dates to the Late Pleistocene. Hence the authors infer that the depositional record in these basins contains an exceptionally high resolution stratigraphy of the Late Pleistocene to Holocene transition. The data also suggest that glacial erosion has not completely removed the pre-Latest Pleistocene record.

E-51896

Larter, R.D., et al, **Seismic reflection investigations on the Pacific margin of the Antarctic Peninsula,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.271-274, 10 refs.

The combined multichannel seismic (MCS) reflection data sets collected by the British Antarctic Survey and Osservatorio Geofisico Sperimentale (Italy) have been used to study the Antarctic Peninsula continental shelf and slope between 63.5S and 68S. These data were supplemented by several MCS profiles provided by the Brazilian Antarctic Programme and by an extensive grid of single-channel seismic profiles provided by Rice University, Texas. The combined data set provides denser and more extensive coverage than has previously been available to individual research groups, allowing more reliable regional mapping and correlation than has been hitherto possible. Four main geological provinces are recognized on the shelf, all trending parallel to the Peninsula. These are: the inner shelf, the shelf basins, the Mid-shelf High (MSH) and the prograded outer shelf.

E-51897

McGinnis, J.P., Hayes, D.E., **Sediment drift formation along the Antarctic Peninsula,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.275-276, 1 ref.

Using seismic sequence stratigraphy, the authors have examined 2 sediment drift deposits along the antarctic continental margin to investigate the sedimentologic processes responsible for their formation. Three strike and 6 dip profiles were collected across the continental slope and rise along the southern portion of the Antarctic Peninsula. From these sections, large sediment drift deposits (here termed the southern, central, and northern) have been identified across the lower slope and rise. Evidence of canyon cutting, as previously described for the central drift deposit, is not observed from the seismic data across the southern drift deposit. Therefore, in contrast to the central drift, it is suggested that along-slope sedimentary processes (i.e., bottom currents) dominate the formation of the southern drift deposit, and that the southern Antarctic Peninsula margin, with its dramatic stratigraphy only now being mapped and analyzed, may provide new opportunities to examine the impact of antarctic paleo-circulation and its glacially modulated pulses on deep-sea sedimentary processes.

E-51898

Rebesco, M., et al, **History of sedimentation on the continental rise west of the Antarctic Peninsula,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project

(ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.277-279, 12 refs.

The continental rise west of the Antarctic Peninsula between 63 and 69S was studied by seismic stratigraphic analysis of multichannel seismic reflection profiles. These data show the growth of 8 large mounds after an earlier stage of more uniform low-energy sedimentation. The history of sedimentation on the continental rise has been reconstructed, with the identification of 6 major seismic sequences (numbered from the sea bed down), from study of the area south of the Tula Fracture Zone, where the age span of the sedimentary section is greater than farther north, and sediment mounds are larger.

E-51899
Sloan, B.J., Anderson, J.B., Lawver, L.A., **Seismic stratigraphy of the Larsen Basin, eastern Antarctic Peninsula,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.281-282, 9 refs.

The Larsen Basin lies behind the extensive Palmer Magmatic Arc and has been the focus of considerable onshore geologic investigation. Two marine geophysical cruises surveyed the Antarctic Peninsula continental shelf east of Seymour I. and south to Jason Peninsula, aboard the R/V *Polar Duke* in 1991 and R/V *Nathaniel B. Palmer* in 1993, respectively. Gravity, magnetics, bathymetry, and single-channel seismic data reveal a zone of Mesozoic volcanics succeeded by Cretaceous and Paleogene clastic beds dipping 3-5 deg east, overlain by Neogene progradational and Plio-Pleistocene aggradational deposits. The post-Eocene section, not preserved onshore, is assumed to have recorded the cooling of peninsular climate and onset of glaciation.

E-51900
Vanneste, L.E., Larter, R.D., **Deep-tow boomer survey of the Antarctic Peninsula Pacific margin,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.283-284, 5 refs.

A high-resolution seismic reflection survey using a Huntec deep-tow boomer system (DTB) was carried out on the outer shelf of the Antarctic Peninsula Pacific margin off Anvers I. during the maiden cruise of RRS *James Clark Ross* in Feb. 1992. The DTB used is owned and operated by the British Geological Survey and has been modified to include digital recording capability and to operate down to 800 m. The DTB provides greater vertical and spatial resolution than conventional surface-towed seismic sources. Two areas were surveyed in detail. In the northern area, multichannel seismic (MCS) reflection profiles show that extensive progradation has advanced the shelf edge by up to 20 km during the last 6 Ma or less. In the southern survey area, an MCS reflection profile shows an aggraded bank near the shelf edge. The close grid of DTB lines in this area shows that the bank forms the northeastern outer flank of a fully enclosed hollow, 20 km across by 100 m deep.

E-51901
Banfield, L.A., Anderson, J.B., **Seismic facies investigation of the Late Cenozoic glacial history of Bransfield Basin, Antarctica,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.285-286, 12 refs.

Approximately 2600 km of high- and intermediate-resolution seismic data and 100 sediment cores were examined to reconstruct the late Cenozoic glacial history of Bransfield Basin. A review of previous seismic studies of sub-polar to temperate glacial marine deposits suggests that the complexity of a glacial setting requires seismic data with actual vertical resolutions of, at most, 20-30 m to adequately image seismic facies. This study demonstrates the utility of higher-resolution seismic records to develop a complete understanding of the complicated nature of glacial seismic facies and then to interpret depositional environments.

E-51902
Barker, D.H.N., Austin, J.A., Jr., **Tectonic evolution of Bransfield Strait, Antarctica: intracrustal diapirism, distributed extension and stratigraphic response to marginal basin rifting,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.287-288, 4 refs.

Results of analysis and interpretation of multichannel seismic (MCS) profiles from Bransfield Strait are presented. The data were acquired to investigate the crustal structure and tectonstratigraphic evolution of the Bransfield Strait marginal basin and South Shetland trench/"fore-arc" system. Among the problems addressed by the project are: styles of rifting in the basin; relationship between known neovolcanism and rift structures; sedimentary responses to rift tectonics and glacioeustatic fluctuations; and preexisting basin structure prior to recent (i.e., post-4 Ma) extension. Over 2000 km of MCS data were acquired by the University of Texas Institute for Geophysics (UTIG) and Lamont-Doherty Earth Observatory (LDEO) on the R/V *Maurice Ewing* cruise 91-01 in Feb. 1991.

E-51903
Bochu, Y., **Characteristics of geophysical fields and lithospheric deformation in Bransfield Strait,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.289-290, 5 refs.

Marine geophysical and geological surveys were carried out in Bransfield Strait between Jan. 1 and Feb. 25, 1991, using the survey ship *Ocean IV.* Approximately 5432 km of depth soundings, 4622 km of gravity, 2926 km of magnetic and 2015 km of MCS profiles, 2 sonobuoy stations and 43 sediment cores were acquired. Bransfield Strait trends NNE-SSW, and the central Bransfield Trough can be divided into three sub-troughs: northern, central and southern. Water depths in the northern and central sub-troughs are greater, reaching 2784 m. In the southern sub-trough, water depths are less than 100 m. On the northwestern side of the Bransfield Trough, the slopes are steep; on the southeastern side the slopes are more gentle.

E-51904
Canals, M., et al, **New reflection seismic data from Bransfield Strait: preliminary results of the GEBRA-93 survey,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.291-292, 6 refs.

During the Dec. 1993 (GEBRA-93) geological survey on board the B.I.O. *Hesperides,* 22 intermediate resolution seismic reflection profiles (1450 km) were acquired in the central and eastern Bransfield basins, complementing a complete swath bathymetry coverage of the area. Seismic profiles in the central Bransfield basin cover the complex neo-volcanic axial region and extend onto the adjacent slopes of Trinity Peninsula and the South Shetland Is. Some additional profiles were shot in the eastern Bransfield basin, and across the Bridgemann I. ridge separating the two basins. Recorded in a digital single-channel mode, most profiles yield a penetration of more than 1.0 s TWT, which proved sufficient to reach the volcanic basement in the basin centers and to penetrate well below the major unconformity identified along the Trinity Peninsula margin.

E-51905
Gambôa, L.A.P., et al, **Origin and evolution of the Bransfield**

Basin based on integrated MCS data, *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.293-294, 5 refs.

An extensive seismic grid provided by groups from Brazil, Italy, China, Japan, and Poland was used to study the geological evolution of the Bransfield Basin, which is a fairly young back-arc basin located between the South Shetland Is. and the Antarctic Peninsula. Its geologic structures are very conspicuous. In the deeper portions of the basin there is a volcanic high, which is interpreted to be a spreading center whose formation is linked to active subduction in the South Shetland Trench. Near the northern end of King George I. the spreading center is disrupted at a transform fault. A northwest-southwest profile shows that the basin is asymmetric. Specifically, the flank of the basin is steeper along the South Shetland Is. than along the Antarctic Peninsula flank. The sedimentary fill of the basin is more clearly imaged along its less inclined southern flank. Very distinctive steep basinward-dipping reflections at this locality are interpreted, based on their seismic character, to represent intercalations of volcanic and volcaniclastic layers that were formed during the initial breakup of the Antarctic Peninsula continental margin.

E-51906

Camerlenghi, A., et al, **Seismic reflection tomography and thermal implications of a gas hydrate bottom simulating reflector on the South Shetland margin (Antarctic Peninsula),** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.295-296, 4 refs.

Results are presented of a study of the gas hydrate bottom simulating reflector (BSR) identified on multichannel seismic reflection lines in the northeastern part of the South Shetland continental margin. The study has been performed using conventional velocity analysis, seismic reflection tomography, and heat flow estimates in order to estimate the extent of the BSR along the continental margin; identify the spatial variations of the wave velocity across the BSR and quantify the low-velocity zone below it; and provide an estimated geothermal gradient and heat flow profile along the margin assuming that the BSR marks the base of the P/T stability field of methane hydrates. The study shows that conventional closely-spaced semblance velocity analyses as well as tomographic inversion of reflected arrivals support the hypothesis that the BSR is due to the presence of a gas hydrate layer overlying a zone of free gas.

E-51907

Kim, Y., Jin, Y.K., **Crustal structure beneath the southeastern end of the Shackleton Fracture Zone and the South Shetland Trench,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.297-298, 5 refs.

During the 1992-93 austral summer season, marine geophysical surveys were conducted with RV Onnuri to the northwest of Elephant I. as part of the Korean Antarctic Research Program. More than 900 km of multichannel seismic data were acquired with a 96 channel streamer and a 16 airgun array of 22 l total volume. Two seismic profiles were processed preliminarily: one is a NE-SW profile which runs from the southwestern corner of the Scotia Sea to Drake Passage across the Shackleton Fracture Zone (SFZ), and the other is a NW-SE profile perpendicular to the axis of the South Shetland Trench.

E-51908

Kim, Y., et al, **Tectonic deformation in the upper crust and sediments at the South Shetland Trench,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.299-301, 12 refs.

The South Shetland Trench is the last remnant of a subduction zone that has been active along the Pacific margin of Gondwana since the late Paleozoic. Multichannel seismic (MCS) reflection data acquired by the British Antarctic Survey, Osservatorio Geofisico Sperimentale (Italy), Korea Ocean Research and Development Institute, and the Brazilian and Polish Antarctic Programs have been used to study tectonic deformation of the oceanic basement and overlying sediments in the region of the trench. The MCS data show that active tectonic deformation is occurring at the South Shetland Trench. The oceanic crust adjacent to and beneath the trench is affected by normal faulting resulting from lithospheric flexure. Seaward-vergent structures indicative of recent, and probably active, convergence are present along the landward side of the trench and within the toe of the accretionary prism. The style of deformation is similar to that commonly found at deformation fronts in trenches at other subducting margins.

E-51909

Galindo-Zaldívar, J., Jabaloy, A., Maldonado, A., Sanz de Galdeano, C., **Transtensional deformation and internal basin evolution in the South Scotia Ridge,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.303-306, 7 refs.

The South Scotia Ridge is a bathymetric high largely composed of continental crustal fragments, which represent the northeastward extension of the Antarctic Peninsula. This ridge is bounded to the N by the oceanic crust of the Scotia Sea and to the S by the oceanic crust of Powell Basin. The transcurrent boundary between the Scotia and Antarctic plates is located in this region. This study focuses on the analysis of seismic profiles and multibeam data in order to establish the geological structure and evolution of the western sector of the South Scotia Ridge.

E-51910

King, E., Leitchenkov, G., Galindo-Zaldívar, J., Maldonado, A., **Basement distribution in Powell Basin: understanding the tectonic controls on sedimentation,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.307-308, 3 refs.

Powell Basin is located between the northeastern tip of the Antarctic Peninsula and the South Orkney microcontinent. The basin is of interest because it is a good example of a small ocean basin which has formed after asymmetric rifting, where one margin (the South Orkney margin) has been substantially starved of sediment since break-up. It may be unique along the Antarctic Peninsula in that it has undergone sedimentation which may not have been subject to strong regional bottom currents, because of the semi-enclosed nature of the basin. A new compilation of multi- and single-fold seismic data has been made, using processed multichannel seismic data together with digital single channel data and analog single fold data. In addition, bathymetry and Geosat gravity were available to provide the physiographic context. Many lines also have total field magnetic measurements.

E-51911

Lawver, L.A., Williams, T., Sloan, B.J., **Seismic stratigraphy and heat flow of Powell Basin,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.309-310, 3 refs.

Seven multi-penetration heat flow measurements were taken in Powell Basin. The values in mW/m^2 are remarkably consistent and the individual values (3 to 5, spaced 1 km apart) for each station were nearly identical. The highest value, 96 mW/m^2, nearly overlies a basement high that may be the extinct spreading center. An age versus heat flow calculation, assuming a background heat flow of 76 mW/m^2, yields an Early Oligocene age. A sedimentation correction to the heat flow might produce a slightly older age of latest Eocene. When both the observed heat flow and the sediment thickness of Powell Basin are compared with those of Jane Basin directly to the east of the South Orkney microcontinent, Powell Basin appears to be about 10 m.y. older. An age of earliest Oligocene or Late Eocene is in keeping with both the observed heat flow and sediment thickness of the basin.

E-51912

Maldonado, A., et al, **Cenozoic continental margin growth patterns in the northern Antarctic Peninsula,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.311-314, 15 refs.

The continental margins of the northern sector of the Antarctic Peninsula are examined on the basis of multichannel seismic profiles and multibeam echo soundings obtained during two oceanographic cruises with the B/O *Hesperides* (ANT92 and HESANT92-93). The growth patterns of continental margins are discussed under different tectonic settings. Three sectors are considered: the Pacific margin of the South Shetland Is.; the complex zone of boundary between the Scotia and Antarctic plates, and the passive margin of the NE Antarctic Peninsula. The structure and depositional units which characterize the evolution of the margin provinces are analyzed, and the paleoenvironmental evolution is discussed on the basis of the sequential seismic stratigraphy and the identification of depositional processes.

E-51913

Rodríguez-Fernández, J., Balanyá, J.C., Galindo-Zaldívar, J., Maldonado, A., **Margin styles of Powell Basin and their tectonic implications (NE Antarctic Peninsula),** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.315-316, 5 refs.

Even though the direction of opening of Powell Basin is uncertain, the morphological and tectonic character of its margins, as well as the observed structures in the central area of the basin and its relations with the sedimentary cover, indicate that there existed a northeastern-southwestern extension. This extension is linked to the separation of the South Orkney microcontinent from the Antarctic Peninsula, with transcurrent movement along the southern boundary of the Scotia plate with the Weddell Sea. This evolution occurs between the Lower Oligocene and the Lower Miocene.

E-51914

Bart, P.J., De Batist, M., Miller, H., **Neogene collapse of glacially-deposited shelf-edge deltas in the Weddell Sea: relationships between deposition during glacial periods and submarine fan development,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.317-318, 2 refs,.

Moons et al. (1992) established the seismic stratigraphic framework of Crary Fan on the upper and lower slope in the southeast region of the Weddell Sea using intermediate resolution seismic profiles acquired during joint AWI-RCMG surveys in the austral summers of 1986-87 and 1989-90. Using seismic stratigraphic criteria, Moons sub-divided the stratigraphic section above the regional Middle Miocene W5 unconformity into 14 sequences. This presentation is a re-investigation that focuses on the correlation and implication of key features seen on the basin floor on 1989-90 seismic data previously not used in the study, and seismic data acquired by AWI-RCMG in 1992.

E-51915

Bonn, W.J., Fütterer, D.K., Grobe, H., **Quaternary sedimentation at the antarctic continental margin,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.319-320, 9 refs.

The authors use a lithostratigraphy adjusted to a stable isotope record from the eastern Weddell Sea to array the Late Quaternary paleoenvironmental changes in relation to climatic cycles. The sedimentary processes considered are ice rafting, current transport, and gravitational downslope transport. They classify the sediments into 5 distinct facies which are correlated to different paleoenvironments. At glacial terminations (isotope events 8.0, 6.0, and 2.0), the antarctic cryosphere adjusts to new climatic conditions. Results show that opal and barium used as proxy parameters give a clear indication of paleoproductivity variations in correlation with the climatic cycles in sediments of the antarctic continental margin.

E-51916

De Batist, M., et al, **Detailed seismic stratigraphy of the Crary Fan, southeastern Weddell Sea,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.321-323, 6 refs.

For this presentation, Norwegian and German-Belgian data sets have been integrated in an effort to establish a more complete seismic stratigraphic model of the Crary Fan depositional system. Crary Fan is composed of 3 major channel-levee complexes: complexes I to III. These partially overlap, indicating a stepwise shift of the depocenter from west to east. After the last major extended glacial period, there was a transition to higher frequency glacial cycles which built a slope that has remained essentially intact. All other Crary Fan channel-levee units probably result from turbidity currents originating from smaller-scale and less catastrophic shedding processes of the slope, following glacial periods too brief to develop unstable oversteepened upper slope profiles. The available data indicate that at least 4 such minor glacial periods occurred during deposition of complex II, and no less than 10 during deposition of complex III.

E-51917

Brancolini, G., Davey, F., **Cenozoic sedimentary geology of the Ross Sea. A review,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.325-328, 22 refs.

The Ross Sea is an area of thinned crust (18-22 km) and is part of the West Antarctic Rift System. The sources of knowledge about the Ross Sea sediments, in particular their age and sedimentation rates, are well data, sub-bottom sampling, and seismics and onshore outcrops; these are reviewed. Sedimentation on the Ross continental shelf is the result of two classes of processes: one common to all the continental margins (subsidence, tectonics, sediment supply and eustasy), and the other restricted to the antarctic margins (crustal flexure from ice loading and sediment dispersal by ice sheet and southern ocean currents). It is concluded that even though recent efforts in international cooperation have greatly improved the exchange of data and ideas between researchers and supported multidisciplinary studies, some basic questions about the Ross Sea geology are still open.

E-51918

Bartek, L.R., Anderson, J.B., Henrys, S.A., **Contributions of high resolution single-channel data to understanding sequence architecture of a glaciated continental margin: Ross Sea Antarctica,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.329-331, 4 refs.

During Leg 2 of the *Polar Duke*-90 cruise in the Ross Sea and *Nathaniel B. Palmer* cruise 93-8, high-resolution seismic data were collected in the eastern, central, and western portions (including McMurdo Sound) of the Ross Sea. The objectives of these cruises were to acquire seismic data that will facilitate regional correlation of stratigraphic events observed in the drill cores from the region and to identify hypothesized glacial seismic facies.

E-51919

Behrendt, J.C., et al, **Late Cenozoic tectonic and volcanic controls on the dynamics of the West Antarctic ice sheet in the West Antarctic rift system,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.333-334, 12 refs.

The CASERTZ and GANOVEX-USGS aeromagnetic results, combined with >100,000 km of widely spaced aeromagnetic profiles, indicate at least 10^6km^3 of probable late Cenozoic(?) volcanic rock in the West Antarctic rift beneath the ice sheet and Ross Ice Shelf, which is comparable to volumes calculated for other mantle plumes. Seismic reflection and radar ice sounding data are interpreted as indicating glacial erosion of volcanic peaks erupted beneath the ice sheet in several places, suggesting this is a general case. Behrendt and Cooper (1991) suggest a possible synergistic relationship between the high uplift rate of the rift shoulder and antarctic glaciation which is generally coincident in late Cenozoic time.

E-51920

Brambati, A., et al, **Paleoenvironmental inferences from the Core ANTA91-30 (Drygalski basin—Ross Sea, Antarctica),** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.335-337, 9 refs.

The major conclusions from this study are: the stratigraphic sequence of core ANTA91-30, collected close to the deeper part of the Drygalski basin (Ross Sea), consists (going upward) of basal till, subglacial meltwater sediment, compound glaciomarine sediment, and siliceous mud; the presence of compound glaciomarine sediment confirms a slow retreat of the grounded ice sheet from this part of the Ross Sea margin after the most recent glacial maximum; the nature of compound glaciomarine sediment suggests high-frequency climatic fluctuations affecting the postglacial ice tongue retreat; and the surface siliceous mud reflects the present-day marine biogenic sedimentation. A series of relatively simple analyses of core sediment can provide a significant amount of consistent information on the environmental changes occurring in the past.

E-51921

Brancolini, G., et al, **Acoustic stratigraphy of Victoria Land Basin—Ross Sea, Antarctica,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.339-340, 7 refs.

The Victoria Land Basin (VLB) is one of four major sedimentary basins in the Ross Sea. The objective of this study is to characterize the sedimentary units of the VLB by an integrated analysis of several thousand kilometers of multichannel and single channel seismic lines. This report describes and interprets some of these units, with particular emphasis on late Cenozoic sedimentary sections in three different, and representative, parts of the VLB: McMurdo, South of the Drygalski ice tongue, and Terra Nova Bay.

E-51922

Busetti, M., Cooper, A.K., **Possible ages and origins of unconformity U6 in the Ross Sea, Antarctica,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.341-343, 18 refs.

Multichannel seismic-reflection (MCS) profiles show evidence for a prominent unconformity in all major sedimentary basins of the Ross Sea. The unconformity separates underlying subparallel strata that fill confined basement grabens from overlying sequences that regionally cover the Ross Sea and prograde the continental shelf. Hinz and Block (1984) first identified and mapped the unconformity U6 in the Eastern basin and Central trough. Since then, U6 has been mapped in greater detail by the ANTOSTRAT Ross Sea regional working group using all existing MCS data. U6 marks an important event in the Ross Sea. Here the authors outline several possible ages and origins for U6, some previously presented and others new.

E-51923

Busetti, M., Zayatz, I., **Distribution of seismic units in the Ross Sea,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.345-348, 12 refs.

Some 30,000 km of multichannel seismic reflection (MCS) data have been collected in the Ross Sea since the 1980s. The MCS data have been used to identify and describe seismic units, and to make two-way-travel time, velocity, and depth maps to the main seismic markers. These maps have then been used to make isopach maps for some widespread seismic units. In the three main depocenters of the Ross Sea, the Eastern basin, the Central trough and the Victoria Land basin, the total sedimentary thickness reaches 9000, 6000 and more than 12,000 m, respectively. On the structural highs (the Central and Coulman highs), the sediment thickness normally ranges between 500 and 2500 m. Almost all seismic units are deformed in the western Ross Sea, whereas in the eastern Ross Sea only the oldest units below U6 are deformed.

E-51924

Cochrane, G.R., DeSantis, L., Cooper, A.K., **Continuity of glacial sequences in the Ross Sea from sonobuoy seismic-refraction data,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.349-352, 10 refs.

The Ross Sea is an example of a rift margin that has been affected by Cenozoic glaciation and exemplifies the sedimentary sequences found elsewhere on the antarctic continental margin. For this study the authors examined the coincident sonobuoy refraction data and multichannel seismic reflection (MCS) data to correlate seismic velocity and gradient changes observed in the MCS data. Sediments with a vertical velocity gradient are rarely observed above U4A in the Eastern or Central Ross Sea. The authors were unable to correlate unconformities across the Coulman high and onto the tectonically active area of the Victoria Land Basin using the MCS data. This correlation may be possible with a combination of high resolution reflection and refraction data, and drilling. In the western Ross Sea, the top of the gradient layer is correlated to velocity discontinuities of Cooper et al. (1987).

E-51925

Cooper, A.K., et al, **Record of Cenozoic tectonism throughout the Ross Sea, and possible controls on the glacial record,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.353-355, 12 refs.

New multichannel seismic reflection (MCS) data interpretations indicate that Late Cenozoic post-U6 rift-related faulting and intrusions occur widely in the Ross Sea. With the exception of the Victoria Land basin, these structures are commonly (but not always) localized or subtle features that show less severe deformation than pre-U6 rift structures. This is due partly to the more limited areal extent of individual structures (i.e. fewer MCS line crossings) and partly to the large depth beneath basins (i.e. inability to image and trace in MCS data). It is suggested that post-U6 Late-Cenozoic rift structures in the Ross Sea region have strongly influenced the movement, and possibly growth and decay, of the large grounded ice sheets that have episodically crossed the Ross Sea with increasing frequency since mid-Cenozoic time.

E-51927

DeSantis, L., et al, **Integration of high- and intermediate-resolution seismic data sets with MCS data to examine the glacial record of the Eastern basin (Ross Sea),** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.359-361, 9 refs.

Analysis of the character of the seismic units, their thickness, regional distribution, and type of shelf margin progradation, shows that the continental shelf of the eastern sector of Ross Sea has experienced several ice sheet groundings since the early Miocene. The interaction of several factors, such as the frequency of sea-level change and variations in the volume of ice-sheets, has contributed to the overall seismic pattern of the margin. Lower frequency sea-level change during the Miocene, relative to the Plio-Pleistocene, resulted in greater duration of grounding events on the continental shelf and thicker subglacial and glacial marine sequences. It is suggested that more emphasis should be given to collecting high- to intermediate-resolution seismic reflection records to investigate the Cenozoic glacial history of the antarctic margins.

E-51928

Della Vedova, B., et al, **ACRUP-1 experiment 1993-94: deep crustal investigations across the Transantarctic Mountains and the adjacent Ross Sea depression (Antarctica),** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.363-365, 5 refs.

ACRUP-1 (Antarctic CRUstal Profile 1) is a multidisciplinary research project in the Ross Sea area supported by the Italian PNRA (Programma Nazionale di Richerche in Antartide) in cooperation with research institutions and universities in Italy, Germany and the U.S. The project was conducted during the austral summer 1993-94 during the IX Italian Antarctic Expedition; it required large resources and major logistic and coordination efforts. The research activities included onshore and offshore seismic experiments, integrated by geological and geophysical investigations. A figure shows the position of the ACRUP-1 profiles and experiments carried out during the 1993-94 field season. The first transect is about 350 km long and extends from the Victoria Land Basin to the Polar Plateau across the Transantarctic Mountains. The onshore part of this experiment was successfully completed. The large data set collected during the ACRUP-1 experiment is currently being processed.

E-51929

Hambrey, M.J., Barrett, P.J., **Cenozoic glacial record of the Ross Sea region, revealed by deep drilling on the continental shelf,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.367-369, 19 refs.

Historically, the Ross Sea region occupies the most important place in deciphering the glacial history of Antarctica. It has been influenced by ice from several major sources, notably the largely marine-based West Antarctic ice sheet, the mainly terrestrial East Antarctic ice sheet, and local ice from the Transantarctic Mountains, a glaciological situation that still prevails today. Reviews and syntheses of the Cenozoic stratigraphic record from the Ross Sea have recently been published elsewhere so only the main elements are presented here, together with a brief mention of some of the problems requiring resolution.

E-51930

Hannah, M.J., **Eocene dinoflagellates form CIROS-1 drill hole, McMurdo Sound, Antarctica,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.371, 7 refs.

CIROS-1 was drilled in western McMurdo Sound to core through a glacial Oligocene sedimentary sequence and sample the underlying preglacial strata to date the onset of glaciation in this part of Antarctica. However, at its total depth of 702 m below sea floor (bsf) the sediments were still glacio-marine. The basal section of the hole (455-792 m bsf) contains a distinctive dinoflagellate assemblage. The close association between the environment of deposition and the distribution of dinoflagellates in the hole implies that the assemblage was not reworked and that the base of the hole is Eocene in age. There is, however, an overlap of Eocene dinoflagellates, which persist up to 455 m bsf, and early Oligocene diatom taxa which appear at 500 m bsf.

E-51931

Henrys, S.A., Bartek, L.R., Anderson, J.B., Barrett, P.J., **Seismic stratigraphy in McMurdo Sound: correlation of high resolution data sets,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.373-374, 16 refs.

During the last twenty years, scientific drilling in McMurdo Sound has produced much new information on the Cenozoic geologic history of the region. Marine single-channel and marine and sea ice-based multichannel seismic surveys complemented the drilling program during this time. Leg 2 of the *Polar Duke* (PD90) cruise in the Ross Sea collected approximately 650 km of excellent high-resolution digital seismic data in McMurdo Sound, with many of the profiles crossing the earlier ship tracks. Twenty unconformity-bound seismic-stratigraphic sequences are identified on PD90 data. The link between the PD90 seismic units and other seismic correlations is summarized in a table. Establishing this new stratigraphy along with reexamination of the earlier data sets has allowed the authors to resolve some of the discrepancies present in the literature and has provided a basis for regional correlations in the Ross Sea.

E-51932

Lawver, L.A., Gahagan, L.M., Cooper, A.K., **Comparison of eastern Ross Sea with Campbell Basin,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.375-377, 21 refs.

The Ross Sea embayment is thought to be extended continental crust that may have undergone up to 100% extension. Marie Byrd Land, Campbell Plateau, Lord Howe Rise, and both North and South New Zealand may also be extended crust. Marine magnetic anomalies found between Campbell Plateau and the eastern Ross Sea/Marie Byrd Land indicate initiation of Pacific-Antarctic seafloor spreading at ca. 85 Ma. Before that time, the Ross Sea, Marie Byrd Land, Campbell Plateau, New Zealand and Lord Howe Rise were contiguous. GEOSAT satellite gravity data and GEBCO bathymetry are used to define the ocean/continent boundary (OCB) for Campbell Plateau. The use of satellite data more tightly constrains plate reconstructions between the Campbell Plateau and Ross Sea than possible in prior comparisons of these areas. The new reconstructions may help explain the late Mesozoic structural evolution of the formerly conjugate extensional basins. In particular, knowledge of the timing of New Zealand extension should provide insight into the history of Ross Sea extension.

E-51933

Marchetti, A.P., Snidarcig, A., **Advanced processing techniques for antarctic data,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.379-380, 7 refs.

A non-standard approach to the processing of Ross Sea data has been undertaken with 4 consecutive steps, which are described. All the tests performed on line IT-90AR69, and then applied to the lines IT-90AR68 and IT-90AR69, are presented and discussed in this work. Comparison with the original processed data shows a significant increase in the data quality.

E-51934

Shipp, S., et al, **High- to intermediate-resolution seismic stratigraphic analysis of Mid- Late-Miocene to Pleistocene strata in eastern Ross Sea: implications for changing glacial/climatic regime,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.381-384, 16 refs.

A change in the frequency and magnitude of strata bound by glacial erosional surfaces occurs across the Miocene to Plio-Pleistocene boundary in the eastern Ross Sea. These changes are interpreted as being related to variations in the rate of sea-level fluctuation and to changes in climatic regime. The working hypothesis assumes that climatic conditions in the region proceeded from temperate/subpolar to polar. Evidence of early temperate/subpolar glacial conditions exists in the continental record. The climate presently is polar. Based on temperate and polar glacial outcrop studies and marine geological studies from other regions, it is anticipated that the change from one climatic regime to another will be recorded acoustically. The last glacial cycle, which is assumed to have occurred under polar conditions, will serve as a template for examining and characterizing older cycles and identifying them as polar or otherwise.

E-51935

Eittreim, S.L., Tanahashi, M., **Review of marine geological and geophysical data collected on the Wilkes Land margin,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.385-387, 19 refs.

A need is found for recompilation of bathymetric maps of the Wilkes Land margin. Many cruises with bathymetric information have traversed this margin using satellite navigation over the last two decades. Much of the data on which the Gebco chart of 1980 is based were pre-satellite navigation. The Cenozoic sedimentary prograded wedges of the outer shelf are particularly well represented in seismic data on this margin. The rift opening between this margin and the Australian-Tasman Rise margin was a complex process that involved the gradation from simple pull-apart in the west to oblique, or strike-slip opening of perhaps younger age to the east of the George V fracture zone. It is suggested that the higher resolution tectonic fabric now available in the Geosat gravity dataset, combined with newer shipboard magnetic field measurements, are likely to yield new insights into how this opening occurred.

E-51936

Eittreim, S.L., Tanahashi, M., Cooper, A.K., Wannesson, J., **Prograded sequences, erosional unconformities, and ice advances on the Wilkes Land margin,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.389-390, 12 refs.

The Chase et al. (1987) bathymetric map shows the Wilkes Land shelf to be composed of outer-shelf banks (less than 400 m), separated by broad, dish-shaped outer-shelf troughs. These outer-shelf troughs are connected to the high-relief, shore-parallel inner-shelf troughs whose floors apparently go to the bases of the present Mertz, Ninnis, and other glacial tongues. The combined inner- and outer-shelf troughs are likely conduits for the extension of the glacial tongues to the outer shelf, presumably as ice streams. Seismic data show that progradational sequences occur immediately below the sea floor of the outer-shelf troughs. Present-day banks however are demonstrably aggradational, not progradational. Modern ice streams emanate from the continental ice sheet at restricted locations and occupy a very small percentage of the total ice margin fronting the sea. To accomplish the great erosion that has occurred to overdeepen the antarctic shelf, such localized ice streams must have crossed the shelf on varied paths over the Tertiary history of ice expansions onto the antarctic shelf.

E-51937

Tanahashi, M., Eittreim, S.L., Wannesson, J., **Seismic stratigraphic sequences of the Wilkes Land margin,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.391-393, 10 refs.

The seismic sequences developed beneath the continental slope and rise of the Wilkes Land margin are summarized. These sequences record the glacial history through relative sea-level change and ice erosion in this region. Although the advance of glacial ice may have eroded away sediments on the shelf, most of those eroded sediments settled in slope and rise areas. Hence the volume of these sedimentary sequences probably reflects the degree of glacial advance in this area.

E-51938

Leitchenkov, G., et al, **Cenozoic seismic stratigraphy of Prydz Bay (Antarctica),** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.395-397, 5 refs.

Prydz Bay is one of the most long-lived continental margins with episodic expansion of grounded ice sheets, where ice sheet grounding is thought to have occurred since Eocene time. An easily accessible continuous cross-section through the different marginal environments (from inner shelf to abyssal plain) also make Prydz Bay an ideal area to study glacial-related depositional processes. In this study the authors discuss the joint interpretation of approximately 17,500 km of seismic data obtained by Australian, Russian, and Japanese expeditions, together with Ocean Drilling Program (ODP) Leg 119 results. A newly compiled bathymetry map is used to provide the physiographic and morpho-structural context. Different glacially-formed features are distinguished in Prydz Bay, showing the complex glacial history of this area.

E-51939

Hambrey, M.J., Ehrmann, W.U., Larsen, B., **Cenozoic sedimentary record of the Prydz Bay continental shelf, East Antarctica,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.399-402, 12 refs.

During Leg 119 of the Ocean Drilling Program, 5 holes were drilled on a transect across the continental shelf in Prydz Bay in the 1987-88 season in order to establish the long-term history of the East Antarctic ice sheet, and in particular to examine the timing and initiation of glaciation at sea level and the subsequent development of the ice sheet, and to improve the understanding of the processes of erosion and sedimentation on a glacier-influenced continental shelf. These aims, combining biostratigraphic, sedimentological and geophysical techniques, were achieved, and a general model for deposition in such a setting was developed. The documented record extends back at least to earliest Oligocene time and possibly middle Eocene.

E-51940
O'Brien, P.E., **Morphology and late glacial history of Prydz Bay, Antarctica, based on echo sounder data,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.403-405, 15 refs.

The Lambert Glacier-Amery Ice Shelf system is the largest outlet glacier flowing from the East Antarctic ice sheet. It ends in Prydz Bay, the site of a major sedimentary basin. This study uses echo-sounder data to investigate sea floor morphology as a framework for understanding sedimentation processes and to develop a model for the retreat of the Amery Ice Shelf from the continental shelf during the last deglaciation. These data are supplemented by preliminary results from the analysis of grabs and gravity cores.

E-51941
O'Brien, P.E., Truswell, E.M., Burton, T., **Morphology, seismic stratigraphy and sedimentary history of Mac. Robertson Shelf, East Antarctica,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.407-408, 9 refs.

The Mac. Robertson Shelf is a narrow, rugged shelf extending from about 60E to Prydz Bay. Whereas Prydz Bay records the advance and retreat of a major outlet glacier and its interaction with the southern ocean, the Mac. Robertson Shelf is bounded by ice cliffs and small glaciers. Prydz Bay is underlain by major sedimentary basins, while the Mac. Robertson Shelf has shallow metamorphic basement. Multichannel seismic reflection lines were collected across the Mac. Robertson Shelf during the summer of 1981-82. Since then, additional bathymetry, sampling, processing of seismic data and the development of satellite gravity measurements have led to reexamination of Mac. Robertson Shelf geology.

E-51942
Quilty, P.G., **Preliminary results of 1993/1994 fieldwork, Marine Plain, Vestfold Hills, East Antarctica,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.409-410, 5 refs.

Marine Plain, about 10 km southeast of Davis Station in the Vestfold Hills, contains an *in situ* roughly horizontal section 7.5 m thick of marine Pliocene sediments, dated on diatoms as being 3.5-4.2 Ma. The section assumes increased importance as a site yielding information on the hotly debated issue of the Pliocene paleoenvironment of Antarctica, the alternatives being a stable icesheet or a significantly reduced icesheet on a continent that carried a significant vegetation. The author argues for a warmer-than-present environment in the Pliocene on the basis of the diatoms, the features of cetaceans, the absence of glacial features in the sediment and some preliminary oxygen isotope figures.

E-51943
Anderson, J.B., et al, **Seismic expression of glaciation on the antarctic continental shelf,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.411-412, 6 refs.

This long-term investigation has focused on acquiring seismic data with sufficient resolution to characterize glacial erosion surfaces and seismic facies and to investigate the history of glaciation on the antarctic continental shelf. Repeated advance and retreat of ice sheets onto the antarctic continental shelf has resulted in a very complex geological setting where stratigraphic units pinch and swell over relatively short distances. These grounding events are not always manifested by progradation of the shelf margin. Intermediate-resolution seismic data are needed to deconvolve the fine-scale stratigraphy of the shelf and thereby its glacial history. This is particularly true for the much-condensed Plio-Pleistocene section. Drill site selection must therefore include results from seismic stratigraphic and facies analysis of higher resolution datasets.

E-51946
Larsen, B., **Morphology and seismic stratigraphy of the East Greenland Shelf in the Denmark Strait area compared to the Prydz Bay, Antarctica,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.427-430, 15 refs.

Cooper et al. (1991) suggested that the antarctic shelf sequences for the Cenozoic can be described largely by two geometries: antarctic type IA sequences, characterized by steeply dipping, well defined foresets, truncated by sharp angular unconformities and strong topsets reflections; and type IIA sequences, which are gently dipping, largely aggradational, and similar to the sequences described from low- and mid-latitude continental margins. The purpose of this paper is to provide a short description of the morphology and seismic stratigraphy of the Denmark Strait area, and compare it to that of Prydz Bay and other antarctic areas to show that type IA and type IIA sequences are seen in arctic settings also.

E-51947
Powell, R.D., **Processes and facies of glacier grounding-line systems with inferences on lithofacies architecture and seismic stratigraphy,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.433-434, 4 refs.

Fluted till is exposed on the sea floor below the floating glacier-tongue of Mackay Glacier, an outlet glacier of the East Antarctic Ice Sheet entering McMurdo Sound. Areas of undisturbed till surface indicate the glacier lifted from its bed during an apparently fast retreat of the grounding line. The timing of the grounding line retreat is currently uncertain; however, diverse epibenthic communities on the surface include varieties of sponge species similar to those found by marine biologists at shallower depths in McMurdo Sound. The sponges are quite large, which probably indicates grounding line retreat at least tens of years ago. Aerial photographs and direct observations since the time of Scott's expeditions document the fluctuation in position of the tongue terminus due to iceberg calving. However, such fluctuations need not reflect movement of the grounding line.

E-51948
Ten Brink, U.S., Schneider, C., **Glacial processes affecting the stratigraphy of the antarctic continental shelf: results from modeling,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.435-436, 8 refs.

The bathymetry and the shallow seismic stratigraphy of the antarctic continental shelf are thought to have been generated by the waxing and waning of the antarctic ice sheets. By using numerical models, scientists seek to understand how the bathymetry and stratigraphy were generated and to quantify the relationship between the observed stratigraphy and the advance of grounded ice masses. The current study examines in addition to the bathymetry the entire glacial stratigraphic sequence. The method is the same: the authors construct numerical models that simulate the salient features in the observations, and vary the input parameters in order to learn about their relative significance. The simulations suggest that, although originally sediments may be deposited close to the grounding line, successive ice advances rework the sediments and spread them more broadly over the shelf and slope. This conclusion is consistent with the interpretation of sediment cores collected from under the Ross Ice Shelf.

E-51949

Vanneste, K., et al, **Comparison of reflection seismic geometries on three different glacial margins,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.437-439, 15 refs.

To illustrate the variety of stratal patterns in a glacial setting, the authors discuss data from three different polar margins: the SE Weddell Sea in Antarctica, the East Greenland shelf off Scoresby Sund, and the Barents Sea margin in the polar North Atlantic. Together with data published in the literature, these examples indicate that several scenarios are possible for the development of a glacial margin. In this paper the authors discuss the stratal geometries observed on the outer continental shelf and upper slope, and those of the lower slope and rise separately.

E-51950

Delisle, G., **Subice topography and its implications on the glacial erosion history and tectonic evolution of Victoria Land during the Cenozoic,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.441-443, 8 refs.

The subice topography of selected areas of Victoria Land, typically covered by 300-1100 m thick ice, was surveyed with a ground based radio echo sounder during the GANOVEX VI (1990-91) and GANOVEX VII (1992-93) expeditions and the ACRUP-I project of the Italian Antarctic Expedition of 1993-94. The amount of glacial erosion in the area during Cenozoic times can be roughly estimated on the basis of the following two observations: the subice topography maps offer evidence for block tectonic movement, which has left blocks exposed in different degrees to erosional processes. Secondly, the subice topography maps clearly indicate the erosional base to coincide frequently with the top section of the basement, indicating that the main mass eroded away by glacial action consisting of Post-Ordovician deposits.

E-51951

Elliot, D.H., **Late Mesozoic and Cenozoic tectonic history of Antarctica: some implications for sediment basin history, sediment provenance and paleoclimate,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.445-447, 22 refs.

The overall tectonic history of Antarctica suggests a general framework for consideration of the possible ages and source regions of the basin fills. The Jurassic and younger tectonic history can be divided into three episodes, each marked by a rifting event: the mid-Jurassic to mid-Cretaceous, which was initiated with the break- up of Gondwana and ended with the antarctic continent in its present configuration and in a near polar position; the mid- Cretaceous to early Cenozoic, which started with major extension in the Ross Embayment-Campbell Plateau region and was followed by break-up between Antarctica and Australia/New Zealand; and the mid and late Cenozoic, during which time rifting was renewed in the Ross Embayment and alkaline volcanism occurred over much of the West Antarctic-Antarctic Peninsula region. The broad scale tectonic history, the records contained in the sedimentary basins, and the interpretations of apatite fission track ages from presently uplifted regions constitute the available sources of information on paleogeography and paleotopography. Except for parts of the Pacific margin, the principal sedimentary basins reflect settings or passive margins. Four regions are considered in this paper: Prydz Bay, the Ross Embayment, the Weddell Embayment and the Antarctic Peninsula.

E-51952

LeMasurier, W.E., Rex, D.C., **Geologic events of the past 100 million years revealed by K-Ar dating of volcanic rocks from Marie Byrd Land: implications for the offshore sedimentary record,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.449-451, 14 refs.

The geologic history of the past 100 m.y. in Marie Byrd Land (MBL) is recorded almost entirely by igneous rocks. K-Ar dating of a late Cretaceous calc-alkaline volcanic suite and a late Cenozoic alkaline volcanic suite provides the chronologic framework for this interval of time, and the petrologic character of these rocks provides a major basis for geologic interpretations. Before the development of the Pacific-Antarctic ridge around 85 Ma, the New Zealand-Campbell Plateau continental block was attached to MBL. For this sector of Antarctica, therefore, the last 100 m.y. is a bridge from the "Gondwana" period of its history to the present. At least four major events during this interval have left a datable record in volcanic rocks.

E-51953

Van der Wateren, F.M., Luyendyk, B.P., Verbers, A.L.L.M., Smith, C.H., **Landscape evolution model of the West Antarctic rift system relating tectonic and climatic evolutions of the rift margins,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.453-456, 28 refs.

The authors suggest that this study demonstrates that different blocks have significantly different landscape evolution histories, which they ascribe to different timing and rates of tectonic uplift. Whereas in some areas (Southern Cross Block, Mountaineer Range) downcutting of major outlet valleys began during the Miocene, in other areas this appears not to have started until the late Pliocene. Glaciation of the summits in most areas occurred before uplift and valley downcutting. The ice sheet covering the summit plateaus probably was not much thicker and, taking higher Mio/Pliocene temperatures into account, possibly even thinner than today's. A major deglaciation and marine transgression in the Wilkes Basin occurred in the early Pliocene, followed by a Plio/Pleistocene readvance of the ice sheet.

E-51954

Webb, P.N., **Paleo-drainage systems of East Antarctica and sediment supply to West Antarctic rift system basins,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.457-461, 26 refs.

East Antarctica was one of the primary sources of sediment for West Antarctic rift system depocenters during the Cretaceous and Cenozoic. Delta systems of the westernmost rift system basins evolved under conditions of active crustal uplift, extension and subsidence, close to the East-West Antarctic lithosphere boundary. The wide variety of sediments delivered to the margins of rift basins were transported via constantly evolving drainage systems, and originated in both the interior and periphery of East Antarctica. The study of East Antarctic source regions, mostly through consideration of geological and geophysical data from the rift system basins, presents a major challenge for future investigations. Eight hypothetical sedimentary systems are proposed in a preliminary attempt to decipher geological events on each side of the lithospheric boundary separating East and West Antarctica. (Auth.)

E-51955
Webb, P.N., Harwood, D.M., Mabin, M.C.G., McKelvey, B.C., **Late Neogene uplift of the Transantarctic Mountains in the Beardmore Glacier region,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.463-467, Refs. p.466-467.

Glacigene strata from the basal Sirius Group (Pliocene) of the upper and middle Beardmore valley contain a succession of marine sediments with *in situ* microfossils, and slightly younger terrestrial sediments with an *in situ Nothofagus* tree flora. Both assemblages developed very close to sea level during the Pliocene and at a time when the Beardmore valley was occupied by a major fjord. The elevation of this fossil material between 1300 and 1700 m above present day sea level is anomalous and must be explained by relatively rapid average uplift rates equivalent to some 350 to 548 m/m.y. Even higher uplift rates close to the rift shoulder margin in the lower Beardmore valley, Queen Alexandra, and Queen Maud Mountains region appear likely. Rapid uplift in this region of the Transantarctic Mountains has important implications for both glacial history and for the derivation and delivery of sediment to the West Antarctic rift system basins. (Auth.)

E-51956
Anderson, J.B., **Sedimentation on the antarctic sea floor: results from the United States Antarctic Piston Coring Program,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.469-470, 22 refs.

Several thousand piston cores have been collected on the antarctic sea floor during the past three decades as part of the United States marine geological effort. These cores are archived at the National Science Foundations Antarctic Marine Geology Research Facility at Florida State University in Tallahassee, FL. Detailed coring and sedimentological studies of continental shelf deposits have been conducted off Wilkes Land in the Ross Sea, on the Antarctic Peninsula continental shelf, in Bransfield Basin, and in the Weddell Sea. Some of the main lessons learned from marine sedimentological studies in Antarctica are summarized.

E-51957
Barker, P.F., **Marine sediment record of the Warm Pliocene around Antarctica,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.471-472, 13 refs.

The onshore sedimentary record of early and middle Pliocene antarctic climate is sparse and almost entirely reworked, but has been interpreted to show much warmer temperatures and greatly reduced ice volumes within the interval 4.8 to 3.2 Ma, compared with the present day. The sampled marine sedimentary record is also sparse, and largely indirect. Before attempting to extend this existing database by drilling the antarctic margins, it is necessary to consider in great detail where one may expect to find optimal sedimentary records of the period. This paper begins that process.

E-51958
Barrett, P.J., et al, **Coring for the antarctic tectonic and climatic history: The Cape Roberts Project,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.473-474, 15 refs.

This project is based on the coring of 1500 m of strata downfaulted seaward of the Transantarctic Mountain Front off Cape Roberts, in the southwest corner of the Ross Sea. The strata are ideally suited for the study because they are close to the South Pole over the last 150 Ma, close to the present antarctic ice sheet and presumably to any past one, and they are just inside the West Antarctic rift system. They are also exposed at the sea floor and hence accessible by shallow drilling.

E-51959
Ehrmann, W.U., Fütterer, D.K., **Clay mineral assemblages in the Cenozoic antarctic ocean,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.475-476, 7 refs.

The authors present typical examples from different morphological and geological settings in the antarctic ocean in order to demonstrate the benefit and shortcomings of clay mineral assemblages for reconstructing the glacial history of Antarctica, the paleoceanographic history of the antarctic ocean and the sedimentary processes at the antarctic continental margin. The examples show that the significance of clay minerals for paleoenvironmental reconstructions strongly varies with both the position of the sites under investigation and the age of the sediments.

E-51960
Ishman, S.E., **Late Neogene record of paleoenvironmental change from the southern ocean: regional and global implications,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.477-478, 9 refs.

The antarctic margin provides the best opportunity to construct an ice proximal paleoenvironmental record for Antarctica. Data from the South Atlantic (ODP 704A) show light $\delta^{18}O$ values relative to today, associated with the predominance of northern component deep water, indicating southern ocean conditions warmer than present in the middle to late Pliocene. These data and others like them are needed for a better understanding of depositional models, ice sheet dynamics and the importance of antarctic ice volume to global conditions.

E-51978
Daniushevskaia, A.I., Petrova, V.I., Romankevich, E.A., **Geochemical features of the organic matter of bottom sediments in the antarctic sector of the Atlantic,** *Oceanology,* Apr. 1993(Pub. Oct. 1993), 33(2), p.175-181, Translated from Okeanologiia. 6 refs.

The authors identify the geochemical features of sedimentary organic matter in various morphostructural zones of the antarctic sector of the Atlantic. Background geochemical organic parameters are presented for the shelf and deep-sea sediments from the Weddell and Scotia seas and the Bransfield Strait. Geochemical organic parameters are a good indicator of environmental and facies variations in sediments and could be used for environmental monitoring of the world ocean. (Auth.)

E-51979
Fitzsimons, I.C.W., Harley, S.L., **Influence of retrograde cation exchange on granulite *F-T* estimates and a convergence technique for the recovery of peak metamorphic conditions,** *Journal of petrology,* Apr. 1994, 35(2), p.543-576, Refs. p.573-575.

Chemical relationships in garnet-orthopyroxene-plagioclase-quartz rocks are governed principally by three equilibria: the Fe-Mg exchange reaction between garnet and orthopyroxene, the solubility of alumina in orthopyroxene coexisting with garnet, and the reaction of garnet and quartz to form orthopyroxene and plagioclase. Various thermobarometric calibrations of these equilibria have been applied to granulite-facies gneisses from two areas of the Proterozoic Complex of East Antarctica, and a wide range of *P-T* estimates is obtained for each area. Some of this *P-T* variation reflects the different thermodynamic data and mineral mixing models used by each calibration, but other differences are attributed to the effects of retrograde Fe-Mg exchange. An inter-specimen spread of temperatures in each area, obtained for mineral core compositions with a single calibration of the garnet-orthopyroxene exchange reaction, is attributed to a variable extent of Fe-Mg exchange on cooling from peak metamorphic conditions. A similar spread of pressures from the garnet-orthopyroxene alumina solubility barometer indicates that this calibration is also reset by retrograde Fe-Mg exchange. (Auth. mod.)

E-52015

Kaminuma, K., ed, NIPR Symposium on Antarctic Geosciences, 13th, Tokyo, Oct. 21-22, 1993, **Proceedings of the NIPR Symposium on Antarctic Geosciences, No.7,** Tokyo, National Institute of Polar Research, 1994, 194p., Refs. passim. For individual papers see E-52020 through E-52030 and L-52016 through L-52019.

This volume contains the proceedings of the 13th Symposium on Antarctic Geosciences held in Tokyo Oct. 21-22, 1993. It comprises 15 full length papers, as well as 11 abstracts of papers pertinent to Antarctica. The papers are arranged by the fields of solid earth geophysics, geology and geomorphology. Topics in solid earth geophysics include reports of absolute gravity measurements at Showa Station and a gravity survey in a new field of Mizuho Plateau. Geological science includes geochronological, petrological and structural studies of the igneous and metamorphic basement rocks of the East Antarctic shield. The geological samples were collected mainly around the Sør Rondane Mountains, the Yamato Mountains, Enderby Land and Showa Station. Geological correlation studies also include other Gondwana fragments such as Sri Lanka and India. Geomorphological science includes studies on glacial movement in the Sør Rondane Mountains and results of geomorphological investigations around Showa Station.

E-52020

Arakawa, Y., Takahashi, Y., Tainosho, Y., **Nd and Sr isotope characteristics of the plutonic rocks in the Sør Rondane Mountains, East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.49-59, 24 refs.

Plutonic rocks in the Sør Rondane Mountains comprise Early Paleozoic granitic rocks and Late Proterozoic tonalite. The former is further classified into 2 types (volcanic arc type and within-plate type). Taking Sr isotope data and element compositions into account, volcanic arc type granites (Dufek, Lunckeryggen and Mefjell) are explained by a fractional crystallization from an isotopically homogeneous magma which was generated from Late Proterozoic lower (to middle) crustal rocks, whereas the within-plate type granites (Vikinghøgda, Rogerstoppane and Pingvinane) are assumed to have been formed mainly by mixing between crustal rocks with high Sr isotope ratios and mafic (to intermediate) parental magma originating in the upper mantle or lower crustal source. The presence of extremely high Sr isotope ratios for the within-plate type granites suggests the involvement of more older crustal rocks (Early to Middle Proterozoic) beneath the Sør Rondane Mountains. Changes of magma sources and a dominant process of magma formation from within-plate type granites (early) to volcanic arc type granites (late) reflect the change of tectonic situation in this region during the Early Paleozoic. (Auth. mod.)

E-52021

Oba, T., Shiraishi, K., **Emplacement pressure of syenite estimated from the stability field of amphibole from the Yamato Mountains, East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.60-68, 11 refs.

Four hornblende clinopyroxene quartz syenites, a hornblende clinopyroxene mela-syenite and a hornblende two-pyroxene syenite from the Yamato Mountains were determined under 0.05-0.3 GPa P_{H2O} in the temperature range 650-900°C, and at the oxygen fugacity of the FMQ buffer. In all syenites except for a mela-syenite (Y405) quartz disappears first, then plagioclase and amphibole in that order with increasing temperature at 0.1 GPa. K-feldspar, in experiments on Y405, disappears at lower temperature than amphibole. In experiments on Y405, Y556 and Y904, albite contents in the synthesized K-feldspar increase slightly with increasing temperature below the solidus temperature, whereas the chemical compositions of K-feldspar are constant and around $Ab_{45}Or_{55}$ above the solidus temperature. The chemical compositions of liquids formed by partial melting of syenites are quartz and corundum normative and show the granite minimum composition at 0.1 GPa. They are similar to the chemical compositions of aplitic granites from the southern Yamato Mountains, suggesting that the aplitic granites are low-pressure derivatives from the syenites. (Auth. mod.)

E-52022

Ishikawa, M., Motoyoshi, Y., Fraser, G.L., Kawasaki, T., **Structural evolution of Rundvågshetta region, Lützow-Holm Bay, East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.69-89, 21 refs.

The highest grade part of the Lützow-Holm Complex crops out on the southern coastline of Lützow-Holm Bay. Orthopyroxene+sillimanite±quartz assemblages reveal high-*T* and high-*P* conditions for peak metamorphism of granulites of Rundvågs Head. Their fabrics also imply regional ductile deformation during peak metamorphism, which was characterized by the formation of a WNW-ESE subhorizontal mineral lineation and the development of high-strain structures such as isoclinal buckling folds (F_n) and boudinage (B_n and B_m). There is little symplectic intergrowth strained intensely, whereas strained cordierite is locally observed. In contrast to the peak metamorphic high-strain deformation, the post-peak metamorphic structural evolution was characterized by low-strain and localized deformations such as F_{n+1} gentle folding, emplacement of clinopyroxene pegmatites and basic dykes, and local shearing in the N-S compressional and E-W extensional field. In response to subsequent N-S compression, ductile thrusting had taken place. The last structural event at Rundvågs Head was represented by the emplacement of felsic pegmatites. (Auth. mod.)

E-52023

Ishikawa, M., Motoyoshi, Y., Fraser, G.L., **Preliminary report on structures of Forefinger Point, Enderby Land, East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.90-100, 23 refs.

Granulite-facies metamorphic rocks of Forefinger Point, lying on the Casey Bay coastline in Enderby Land, have been affected by three stages of folding, shear zone formation, and intrusion of pegmatite. The peak metamorphic structural evolution was characterized by the development of F_n isoclinal to close buckling folds. This deformation was associated with the coexistence of orthopyroxene+sillimanite±quartz, and was followed by the formation of cordierite and symplectites of cordierite+sapphirine, orthopyroxene+cordierite+sapphirine in response to subsequent isothermal decompression. Although the Forefinger Point granulites have undergone high strain deformation under peak metamorphic conditions, they experienced only low and local strain deformation after peak metamorphism. The post-peak-metamorphic structural evolution was characterized by the development of F_{n+1} open to gentle buckling folds, narrow shear zones and emplacement of pegmatite. (Auth. mod.)

E-52024

Motoyoshi, Y., Ishikawa, M., Fraser, G.L., **Reaction textures in granuiites from Forefinger Point, Enderby Land, East Antarctica: an alternative interpretation on the metamorphic evolution of the Rayner Complex,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.101-114, Refs. p.112-114.

Aluminous granulites from Forefinger Point in Enderby Land preserve a variety of reaction textures which demonstrate a part of the *P-T* evolution. On the basis of the petrographical evidence, several reactions are inferred. These reactions are visualized on a simplified (Fe,MG)O-Al_2O_3-SiO_2 diagram. The reactions imply nearly isothermal decompression after the peak metamorphic conditions. The prograde segment of the *P-T* path is inferred by relict spinel and corundum inclusions invariably rimmed by sapphirine in silica-undersaturated granulites. On the basis of the petrographical interpretation and preliminary results of SHRIMP dating, it is concluded that the Forefinger Point granulites probably do not represent a reworked portion of the Archaean Napier Complex, but rather may be the result of Cambrian events in the East Antarctic Shield. (Auth. mod.)

E-52025

Tainosho, Y., Kagami, H., Takahashi, Y., Iizumi, S., Osanai, Y., Tsuchiya, N., **Preliminary result for the Sm-Nd whole-rock age of the metamorphic rocks from Mount Pardoe in the Napier Complex, East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.115-121, 12 refs.

The Sm-Nd whole rock isochron age was determined for metamorphic rocks from Mount Pardoe, Napier Complex. Acidic gneiss (orthopyroxene-mesoperthite-quartz gneiss), being one of the main representative metamorphic rocks, gave an age of 2516±274 Ma with an initial ^{143}Nd/^{144}Nd ratio of 0.50914. εNd values normalized to 2516 Ma for individual acidic gneiss range from -3.7 to -7.0. This Sm-Nd whole-rock isochron age indicates a major period of equilibrium of the isotopic system on a whole-rock scale at 2516±274 Ma. (Auth.)

E-52026

Owada, M., Osanai, Y., Kagami, H., **Isotopic equilibration age of Sm-Nd whole-rock system in the Napier Complex (Tonagh Island), East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.122-132, 23 refs.

Whole-rock measurements of ^{143}Nd/^{144}Nd and ^{147}Sm/^{144}Nd are reported for gneisses which have undergone granulite-facies metamorphism in Tonagh I. from the Napier Complex. Felsic and ultramafic gneisses in adjacent outcrops yield a well-defined isochron age of 2458±61 Ma with an initial ratio of 0.50897. These gneisses show a granuloblastic microfabric overprinted by a pervasive intercrystalline texture. The negative εNd value suggests that the isochron age indicates re-equilibration of the isotopic system on a whole-rock scale at 2458±61 Ma. Mafic gneisses, which crop out as thin layers alternated with pelitic and felsic gneisses, yield an isochron with an age of 3708±533 Ma. The mafic gneisses display a uniform granuloblastic texture. The age of 3708 Ma is older than c. 3070 Ma, which has been regarded as the earliest tectonothermal age in the complex. εNd values at 3708 Ma for individual mafic gneiss range from +1.3 to +3.3. The values are within the range of Archaean komatiites and basalts, suggesting that the mafic gneisses were derived from the depleted mantle at c. 3700 Ma. (Auth.)

E-52027

Ueno, N., Ogata, A., Funaki, M., **K-Ar ages of igneous and metamorphic rocks from McMurdo, Sør Rondane and Dumont d'Urville, Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.133-142, 14 refs.

K-Ar radiometric ages were determined for igneous and metamorphic rocks from the antarctic margin. Twenty-five volcanics of 11 sites from McMurdo Sound yielded figures between 0.08 and 4.15 Ma. Two syenites from the Sør Rondane Mountains were about 400 Ma and three granitic rocks from Dumont d'Urville Station area were around 1000 Ma. (Auth.)

E-52028

Nakai, M., **Anisotropy of magnetic hysteresis properties of audio-tape samples: its application for the magnetic anisotropy of gneissic rocks,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.143-155, 21 refs.

The magnetic anisotropy of hysteresis properties of audio-tape samples which were made from single domain (SD) of γ-hematite were measured using a vibration sample magnetometer (VSM). Subsequently after alternating field demagnetization (AF demagnetization) of natural remanent magnetization (NRM) up to 60 mT, the anhysteretic remanent magnetization (ARM) was produced by applying an external alternating field up to 120 mT under the geomagnetic field in the laboratory. After these ARM acquisitions, the ARMs were demagnetized by AF field up to 70 mT. The most stable remanent magnetization after AF demagnetization remained parallel to the maximum axis of H_C and of I_R. On the basis of the similarity of the magnetic properties between the tape sample and the gneissic rocks from the Skarvsnes Foreland area, it is clear that SD alignment in rocks shows the anisotropic maximum axis of X_{diff} to be perpendicular that of I_R and H_C. Therefore, this anti-phase of the anisotropy may be an important index to determine SD alignment in metamorphic rocks. The present study suggests that the NRM from old rocks does not always show the ancient geomagnetic field. (Auth. mod.)

E-52029

Moriwaki, K., Iwata, S., Matsuoka, N., Hasegawa, H., Hirakawa, K., **Weathering stage as a relative age of till in the central Sør-Rondane,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.156-161, 5 refs.

The Sør Rondane Mountains are covered in places with variously weathered tills that form lateral moraines and/or moraine fields on the flanks of the mountains or supraglacial moraine fields around the mountains. Surface gravels of 47 tills were examined for determining the degree of weathering, and these tills were classified into 5 weathering stages. The measurement and classification methods are very simple but useful for understanding the outline of the glacial history of the region, especially the younger part. (Auth.)

E-52030

Kagami, H., **Ritscher Canyon off Breid Bay, Dronning Maud Land, East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.162-175, 25 refs.

After compilation of a new bathymetric map, it is found that tributaries of Ritscher Canyon change their course sharply eastward at latitude 68°S, which indicates the presence of a strong eastward current at the mouths of tributaries during deposition of the R2 sequence. It is also found that the Ritscher deep-sea fan develops at the base of the upper continental rise. This margin shows a steeper gradient (>0.0075) on the upper continental rise, due to enormous delivery of sediments from the continent during deposition of the R2 sequence. The gradient of 0.0075 is found to be a critical value for the continental margin where a hydrodynamic jump occurs from turbulent flow to laminar flow, resulting in discharge of sediment load to form a deep-sea fan. The margin distributes from Queen Maud Land to at least the Weddell Fan area of East Antarctica, and here is called the East Antarctic margin. This value corresponds roughly to the boundary between the continental slope and the upper continental rise in the Bellingshausen margin in West Antarctica, which is similar to that of the Atlantic margin; thus it belongs to the Atlantic margin type. (Auth. mod.)

E-52070

Berkman, P.A., ed, Yoshida, Y., ed, International Workshop, Tokyo, Oct.20-22, 1993, **Holocene Environmental Changes in Antarctic Coastal Areas. Proceedings,** *Tokyo. National Institute of Polar Research. Memoirs. Special issue,* Aug. 1994, No.50, 107p., Refs. passim. For individual papers see B-52071, C-52072, I-52073 and G-52074 through G-52076.

The papers in this volume are based on presentations at a workshop that addressed environmental changes in antarctic coastal areas during the Holocene. The principal topics of the six papers enclosed include ecology, geochemistry, paleoclimatology, glaciomarine sedimentation, raised beaches, and glacial retreat of the Antarctic Ice Sheet in different coastal areas.

E-52072

Berkman, P.A., **Geochemical signatures of meltwater in mollusc shells from antarctic coastal areas during the Holocene,** *Tokyo. National Institute of Polar Research. Memoirs. Special issue,* Aug. 1994, No.50, International Workshop on Holocene

Environmental Changes in Antarctic Coastal Areas, Tokyo, Oct. 20-22, 1993. Proceedings. Edited by P.A. Berkman and Y. Yoshida, p.11-33, Refs. p.23-27.

Compositional, crystallographic and isotopic characteristics in calcitic shells of the scallop *Adamussium colbecki* were analyzed to interpret meltwater impacts in antarctic coastal areas during the last 10,000 years. Adjacent to glacial meltwater streams in west McMurdo Sound, live scallops had complementary trace element, unit cell volume and oxygen isotope profiles from 6 to 27 m depth. Radiocarbon reservoir corrections, based for the first time on antarctic molluscs collected before 1945, were developed to constrain the Holocene chronologies of fossil *Adamussium* analogs. The similar 50 per mill offset between the pre-nuclear and post-nuclear $\delta^{14}C$ concentrations, in both antarctic molluscs and seawater south of 60°S, indicates that a 1400±100 year reservoir correction is generally appropriate for antarctic molluscs. Considering the temporal context of the shell $\delta^{18}O_c$ (PDB) values in *Adamussium* fossils from Terra Nova Bay, it is suggested that there was more meltwater along the Victoria Land Coast during the middle Holocene than at present. Together, these molluscan shell analyses provide a geochemical framework for assessing the responses of the antarctic ice sheet margins to climate changes and their contribution to sea level during the Holocene. (Auth. mod.)

E-52074

Yoon, H.I., Kim, Y., Choe, M.Y., Nam, S.H., **Glaciomarine sedimentation and paleoglacial setting of Marian Cove, King George Island, Antarctica,** *Tokyo. National Institute of Polar Research. Memoirs. Special issue,* Aug. 1994, No.50, International Workshop on Holocene Environmental Changes in Antarctic Coastal Areas, Tokyo, Oct. 20-22, 1993. Proceedings. Edited by P.A. Berkman and Y. Yoshida, p.41-48, 18 refs.

The sea floor of Marian Cove is highly rugged and is covered by a very thin drape of sediments, suggesting that this area has been recently eroded by glaciers with minimal posterosional sediment accumulation. A piston core shows a vertical lithofacies, changing from waterlain till through meltwater deposits to pebbly mud as the result of a combination of ice rafting and suspended sedimentation. A reconstruction of the glacial history of this area since the late glacial maximum shows grounded ice filling the cove in late Holocene time and retreat of the ice sheet from the cove at least 1300 yrs BP, accompanied by a marine transgression. (Auth.)

E-52075

Hayashi, M., Yoshida, Y., **Holocene raised beaches in the Lützow-Holm Bay region, East Antarctica,** *Tokyo. National Institute of Polar Research. Memoirs. Special issue,* Aug. 1994, No.50, International Workshop on Holocene Environmental Changes in Antarctic Coastal Areas, Tokyo, Oct. 20-22, 1993. Proceedings. Edited by P.A. Berkman and Y. Yoshida, p.49-84, Refs. p.67-71.

Geomorphological investigations of raised beaches were conducted in the Lützow-Holm Bay region to interpret the age and elevations of Holocene marine limits in relation to the glacial history of ice-free coastal regions around Antarctica. Prior to the Holocene, it is inferred, based on the recent data, that the incursion of the sea took place between 35,000 and 40,000 yr BP. Holocene-raised beach deposits developed most extensively below 20 m asl in the Lützow-Holm Bay region and there was a significant correlation between their elevations and ages. A high sea level stand appears to have occurred between 4000 to 5000 yr BP in this region; above 25 m asl, the Holocene marine limits cannot be reliably determined. This is accordant with other antarctic regions where the maximum heights of raised beaches have not been identified above 30 m asl. Together, the age and elevation characteristics of these raised beaches suggest that there has been minimal antarctic ice-sheet expansion since the Last Glacial Maximum. (Auth.)

E-52076

Baroni, C., **Notes on Late-Glacial retreat of the Antarctic Ice Sheet and Holocene environmental changes along the Victoria Land coast,** *Tokyo. National Institute of Polar Research. Memoirs. Special issue,* Aug. 1994, No.50, International Workshop on Holocene Environmental Changes in Antarctic Coastal Areas, Tokyo, Oct. 20-22, 1993. Proceedings. Edited by P.A. Berkman and Y. Yoshida, p.85-107, Refs. p.96-99.

Distinct recessional phases with minor readvances of the outlet glaciers in Victoria Land are documented during Late Glacial times when the Antarctic Ice Sheet and its fringing ice shelves receded from the continental shelf in the Ross Sea embayment. Abandoned penguin rookeries supply data both on the history of the glacial retreat that followed the LGM and environmental changes during the Holocene. These were found along the Victoria Land coast and supplied more than seventy ^{14}C dates as old as 13070±405 ^{14}C yr BP (GX-18483). Marine ingression and the glacio-isostatic uplift of the coastal areas that led to the formation of Holocene raised beaches accompanied deglaciation. Several ^{14}C dates obtained from shells collected in raised marine sediments and from fossil rookeries resting on the raised beaches constrain a relative sea-level curve for central Victoria Land. Penguins are sensitive to changes in antarctic climate and to the environmental parameters that determine their presence and distribution, which seem to have changed many times during the Holocene in the Ross Sea. Holocene glacier variations in the Terra Nova Bay area are documented for outlet and local glaciers as well as for ice shelves. (Auth.)

E-52092

Bejarniya, B.R., Joshi, A., **Deformational history and shape analysis of folds in the metamorphic rocks of the Petermann Ranges, East Antarctica,** *Geological Society of India. Journal,* Dec. 1992, 40(6), p.487-500, 19 refs.

Considered earlier to be very little deformed, the granulite facies rocks of the Petermann Ranges reveal three phases of folding and two episodes of ductile shearing. These metamorphic rocks preserve the F_1 folds as small scale, rootless, intrafolial features with tight to isoclinal profiles, and F_2 folds as mesoscopic features with close to tight profiles. F_1 and F_2 folds are coaxial and broadly coplanar, having axial surfaces marked by pervasive NW-SE striking foliation. F_3 folds are open, upright with N-S to NNW-SSE axial planes and impart local swings in the regional foliation. The early ductile shears produce a strong mylonitic fabric and are synchronous to F_1; while occurring as thin wavy zones, the later shears are post F_2. Shape and geometric analyses of representative folds show that F_1 folds belong to class 2 and 1C at low and high limb dips respectively and are formed dominantly by flexural flow. F_2 folds exhibit geometric features of class 1C at low as well as high limb dips and owe their origin to buckling with a flexural slip component and flattening. (Auth.)

E-52093

Kurat, G., Koeberl, C., Presper, T., Brandstätter, F., Maurette, M., **Petrology and geochemistry of antarctic micrometeorites,** *Geochimica et cosmochimica acta,* Sep. 1994, 58(18), p.3879-3904, Refs. p.3898-3901.

The petrology and geochemistry of twenty-three chondritic dust particles with masses of 1-47 microg (sizes 100-400 microns) were recovered from blue ice near Cap Prudhomme and studied by INAA, ASEM, EMPA, and optical microscopy. Sample selection criteria were irregular shape and (for a subsample) black color, with the aim of studying as many unmelted micrometeorites (MMs) as possible. Of 13 unmelted MMs, 6 were phyllosilicate-dominated MMs, and 7 were coarse-grained crystalline MMs consisting mainly of olivine and pyroxene. The remaining 10 particles were largely melted and consisted of a foamy melt with variable amounts of relic phases (scoriaceous MMs). The bulk chemistry of the phyllosilicate MMs is similar to that of CM chondrites. However, several elements are either depleted or enriched in MMs as compared to CM chondrites. Similar depletions and enrichments are also found in the scoriaceous MMs. It is suggested that the depletions are probably due to terrestrial leaching of sulfates and carbonates from unmelted MMs. The overabundance of some elements may also be due to processes acting during atmospheric passage such as the recondensation of meteoric vapors in the high atmosphere. (Auth. mod.)

E-52094

Kavun, M.M., Vinnikovskaia, O.S., **Seismic stratigraphy and tectonics of the northwestern Weddell Sea (Antarctica) inferred from marine geophysical surveys,** *Tectonophysics,* Dec. 30, 1994, 240(1-4), p.299-341, Refs. p.340-341.

Marine geophysical studies of the northwestern Weddell Sea show several interesting stratigraphic and tectonic features. Synthesis of the ODP drilling results on the South Orkney Microcontinent with the Circum-Antarctic depositional model allows identification of the main reflectors within the Cretaceous-Cenozoic sedimentary cover. The age and composition of pre-rift, syn-rift and post-rift units probably vary throughout the region. The observed seismic pattern of the Jane Bank suggests a young asymmetric zone of extension. A seismic record across the South Orkney Trough and Central Scotia Basin indicates an association with an accretion zone and spreading center. (Auth.)

E-52098

Gore, D.B., Colhoun, E.A., Bell, K., **Derived constituents in the glacial sediments of the Vestfold Hills, East Antarctica,** *Quaternary science reviews,* 1994, 13(3), p.301-307, Refs. p.306-307.

Sediment derived from pre-existing marine deposits and weathered surfaces is a common constituent of glacial drift in the Vestfold Hills. Ninety-seven samples of glacial drift were examined for marine macrofossils and weathered clasts, and 41 were examined for foraminifera. Fragments or whole specimens of shells, worm tubes, sponge spicules and foraminifera were recovered from 25 samples. Clasts that exhibited evidence of subaerial weathering, such as tafoni and weathering rinds, were found in 53 samples. Derived sediment was found in 62% of all samples. These data indicate that the last advance of ice derived much of its sediment locally. The incorporation of marine fauna in the glacial deposits makes the identification of *in situ* interglacial sequences difficult. (Auth.)

E-52103

Duncan, R.A., ed, Rea, D.K., ed, Kidd, R.B., ed, Von Rad, U., ed, Weissel, J.K., ed, **Synthesis of results from scientific drilling in the Indian Ocean,** *American Geophysical Union. Geophysical monograph series,* 1992, No.70, 475p., Refs. passim. For selected papers see E-52104 through E-52114.

DLC QE350.5.I52

The 22 papers assembled in this volume, 11 of which are pertinent to Antarctica, synthesize drilling results from the nine-leg Indian Ocean campaign of 1987-1989. The reports are grouped under 3 thematic areas: Oceanic lithosphere, Tethys ocean margins, and Indian Ocean history. A table and a figure detail the objectives and logistics of the ODP drilling program.

E-52104

Weis, D., et al, **Influence of mantle plumes in generation of Indian oceanic crust,** *American Geophysical Union. Geophysical monograph series,* 1992, No.70, Synthesis of results from scientific drilling in the Indian Ocean. Edited by R.A. Duncan, D.K. Rea, R.B. Kidd, U. von Rad, and J.K. Weissel, p.57-89, Refs. p.86-89.

DLC QE350.5.I52

The physical and chemical behavior of mantle plumes and hotspots, and their role in the generation of oceanic crust, have been investigated through deep ocean drilling in the Indian Ocean. High density sampling of crustal rocks has established the continuity of volcanic activity along the two major hotspot tracks in this basin—those formed over the Réunion and Kerguelen plumes. The volcanic lineaments link present hotspots to huge flood basalt provinces which are the initial occurrence of mantle plumes. Drilling in the Indian Ocean has provided the first significant sampling of oceanic plateaus, such as large portions of the Kerguelen Plateau, showing that these are entirely volcanic in origin and are probably oceanic equivalents of continental flood basalt provinces. These are significant components in intraplate ocean crust formation and are derived from melting of plume and asthenosphere mantle mixtures. Major and trace elements together with isotopic compositions of erupted products changed with time along these two hotspot tracks. (Auth. mod.)

E-52105

Duncan, R.A., Storey, M., **Life cycle of Indian Ocean hotspots,** *American Geophysical Union. Geophysical monograph series,* 1992, No.70, Synthesis of results from scientific drilling in the Indian Ocean. Edited by R.A. Duncan, D.K. Rea, R.B. Kidd, U. von Rad, and J.K. Weissel, p.91-103, Refs. p.101-103.

DLC QE350.5.I52

The volcanic record of Indian Ocean hotspots offers the opportunity to study the complete dynamic, kinematic, chemical and thermal histories of individual mantle plumes. Plate motions over the Réunion and Kerguelen hotspots, since 65 Ma and 117 Ma, respectively, have produced linear, age-progressive chains of volcanic ridges and islands. Ocean drilling has documented the continuity of these provinces which provide a direct and simple frame of reference for plate reconstructions. Hotspots have remained stationary throughout their long history, and reflect a stable, mantle-wide pattern of convective upwelling. Comparison of hotspot and paleomagnetic reference frames reveals a small component of true polar wander during the early Tertiary. The Réunion and Kerguelen hotspots began with construction of massive flood basalt platforms, both on continental and oceanic lithosphere, and produced at rates at least an order of magnitude faster than present hotspot activity. (Auth.)

E-52106

Bitschene, P.R., Dehn, J., Mehl, K.W., Schmincke, H.U., **Explosive ocean island volcanism and seamount evolution in the central Indian Ocean (Kerguelen Plateau),** *American Geophysical Union. Geophysical monograph series,* 1992, No.70, Synthesis of results from scientific drilling in the Indian Ocean. Edited by R.A. Duncan, D.K. Rea, R.B. Kidd, U. von Rad, and J.K. Weissel, p.105-113, Refs. p.112-113.

DLC QE350.5.I52

Ocean island/seamount evolution on the Kerguelen Plateau occurred at about 80 Ma, when peridotite xenolith-bearing alkali basalt magmas (OIB) erupted onto the foundering basaltic basement. Erosion of the Kerguelen Plateau, a large igneous province topped with Cretaceous ocean islands/seamounts, including outcropping peridotite massifs, was the source for regional Cr and Ir anomalies in Cretaceous Indian Ocean marine sediments. Explosive ocean island volcanism on the Kerguelen Plateau is manifested by marine ash layers in Oligocene to Recent sediments. Peaks of explosive ocean island volcanism occurred in the Early Oligocene, Middle to Late Miocene, Pliocene, and Late Quaternary. The marine ash layers coincide chemically and chronologically with the pulses of enhanced magmatic activity on the Kerguelen Is. The basaltic ashes match transitional mid-ocean ridge basalt (T-MORB) composition from the Kerguelen Plateau. (Auth. mod.)

E-52107

Coffin, M.F., **Emplacement and subsidence of Indian Ocean plateaus and submarine ridges,** *American Geophysical Union. Geophysical monograph series,* 1992, No.70, Synthesis of results from scientific drilling in the Indian Ocean. Edited by R.A. Duncan, D.K. Rea, R.B. Kidd, U. von Rad, and J.K. Weissel, p.115-125, Refs. p.124-125.

DLC QE350.5.I52

Borehole results from Indian Ocean plateaus and submarine ridges help to constrain their subsidence histories. The author uses a simple Airy isostatic model to calculate basement depths at ODP sites in the absence of sediment, and then backtracks these sites using previously determined age-depth relationships for oceanic lithosphere to determine the original depth or elevation of the sites. Resulting subsidence curves for each site are then checked by examining sedimentologic and biostratigraphic evidence for when each site subsided below shelf depths. The analysis suggests that thermal subsidence has been the dominant tectonic process affecting Indian Ocean plateaus and submarine ridges following emplacement. It is concluded that large portions of these features were emplaced and began subsiding well above sea level, similar to large igneous provinces (LIPs) worldwide today. This resulted in significant subaerial erosion and redeposition of volcanic material mixed with biogenic sediment, and a gradual development of facies from terrestrial through terrigeneous to shallow water and pelagic, resulting in a sedimentary record with both continental and oceanic characteristics. (Auth.)

E-52108

Holmes, M.A., Watkins, D.K., **Middle and Late Cretaceous history of the Indian Ocean,** *American Geophysical Union. Geophysical monograph series,* 1992, No.70, Synthesis of results from scientific drilling in the Indian Ocean. Edited by R.A. Duncan, D.K. Rea, R.B. Kidd, U. von Rad, and J.K. Weissel, p.225-244, Refs. p.243-244.

DLC QE350.5.I52

The east Indian Ocean opened during the Early Cretaceous when India separated from Australo-Antarctica to form the Wharton Basin where hotspot activity formed the Naturaliste Plateau and Kerguelen Plateau-Broken Ridge (KPBR). KPBR was a volcanic archipelago forested by a mild and wet climate-loving climax forest of podocarpaceaen conifers with an understory of tree and seed ferns. Elevated kaolinite at several sites and gibbsite on Kerguelen Plateau further indicate an Albian warming. The warm climate persisted through the Cenomanian as reefs formed on the southeast margin of India, but began to decline during the Turonian as kaolinite disappeared from southern sites. The Wharton Basin had sunk to sub-CCD abyssal depths by this time. The western KPBR formed a shallow shelf in a poorly circulated region where thick greensands accumulated over the slowly subsiding Kerguelen Plateau. In the Paleocene, circulation over KPBR improved and a diverse bryozoan-dominated benthonic fauna and flora developed on KPBR. The mid-Campanian is marked by a nearly ocean-wide disconformity which corresponds to the development of marked provinciality of the calcareous plankton. (Auth. mod.)

E-52109

Pospichal, J.J., Huber, B.T., **Cretaceous/Tertiary boundary in the southern Indian Ocean: results from the coring operations of the Ocean Drilling Program,** *American Geophysical Union. Geophysical monograph series,* 1992, No.70, Synthesis of results from scientific drilling in the Indian Ocean. Edited by R.A. Duncan, D.K. Rea, R.B. Kidd, U. von Rad, and J.K. Weissel, p.275-294, Refs. p.292-294.

DLC QE350.5.I52

Recent coring in the Indian Ocean during Ocean Drilling Program (ODP) Legs 119-122 has resulted in the recovery of several continuous or near continuous Cretaceous/Tertiary (K/T) boundary sections. Paleontological, sedimentological, and geochemical data have been compiled from these sequences and are summarized in this report with emphasis on calcareous nannofossil and foraminiferal distributions. Leg 119 recovered a complete K/T section at Site 738 on the southern tip of the Kerguelen Plateau at a latitude of 63°S. This high-latitude sequence was complemented by the Leg 120 Site 750 recovery of a nearly complete section at 55°S, also on the Kerguelen Plateau. These two sections are important in that they provide data from the high latitudes, where few sites have been drilled. Preservation of calcareous microfossils is generally moderate or poor at each site, but intervals with good preservation are present above and below the boundary at Sites 738 and 750. (Auth. mod.)

E-52110

Meyers, P.A., Dickens, G.R., **Accumulations of organic matter in sediments of the Indian Ocean: a synthesis of results from scientific deep sea drilling,** *American Geophysical Union. Geophysical monograph series,* 1992, No.70, Synthesis of results from scientific drilling in the Indian Ocean. Edited by R.A. Duncan, D.K. Rea, R.B. Kidd, U. von Rad, and J.K. Weissel, p.295-309, Refs. p.308-309.

DLC QE350.5.I52

Scientific ocean drilling has documented a number of episodes of organic-carbon-rich-sediment accumulation which occurred throughout the history of the Indian Ocean. These accumulations are noteworthy because organic-rich marine sediments are uncommon, and their existence indicates special paleodepositional conditions. Two general types of organic-carbon-rich sediments appear in the drilled record of Indian Ocean sedimentation—those that contain marine organic matter and those that have land-derived organic matter. Some accumulations of land-derived organic matter record the existence of formerly elevated areas and times of milder climate. Freshwater coals were laid down on the margin of East Antarctica during temperate Albian climates. These coals are the probable source of continental organic matter present in Eocene diamictites in Prydz Bay. Silty claystones and sandstones containing up to 1% coaly organic matter accumulated on the Kerguelen Plateau in the late Albian and suggest the former existence of freshwater swamps on this now submerged plateau. (Auth. mod.)

E-52111

Baldauf, J.G., Barron, J.A., Ehrmann, W.U., Hempel, P., Murray, D., **Biosiliceous sedimentation patterns for the Indian Ocean during the last 45 million years,** *American Geophysical Union. Geophysical monograph series,* 1992, No.70, Synthesis of results from scientific drilling in the Indian Ocean. Edited by R.A. Duncan, D.K. Rea, R.B. Kidd, U. von Rad, and J.K. Weissel, p.335-349, Refs. p.348-349.

DLC QE350.5.I52

A spatial and temporal framework of the history of biosiliceous sedimentation patterns in the Indian Ocean for the last 45 million years is identified based on the occurrence of diatom and percent opal composition of the sedimentary sequences recovered from scientific drilling in the Indian Ocean by the Deep Sea Drilling Project and the Ocean Drilling Program. Unlike the northwest Indian Ocean, the southern Indian Ocean exhibits low diatom abundance and opal values during the Late Eocene, followed by an abrupt increase in both the diatom abundance and in the percent opal composition at about 35.8 Ma, most likely reflecting increased productivity in the southern ocean resulting from destratification of the water column and increased polar cooling. Opal values remain moderate and fairly constant during the Oligocene through the Middle Miocene and increase to present-day values during the latest Miocene. (Auth. mod.)

E-52112

Zachos, J.C., Rea, D.K., Seto, K., Nomura, R., Niitsuma, N., **Paleogene and Early Neogene deep water paleoceanography of the Indian Ocean as determined from benthic foraminifer stable carbon and oxygen isotope records,** *American Geophysical Union. Geophysical monograph series,* 1992, No.70, Synthesis of results from scientific drilling in the Indian Ocean. Edited by R.A. Duncan, D.K. Rea, R.B. Kidd, U. von Rad, and J.K. Weissel, p.351-385, Refs. p.381-385.

DLC QE350.5.I52

The authors have compiled Paleogene and Early Neogene benthic foraminifer stable isotope records from 20 Indian Ocean DSDP and ODP sites. Subsidence histories and age models were developed for each site using nannofossil biochronology as the primary means of age control. With this information a continuous Early Paleocene to Late Miocene isotopic time series was assembled for the Indian Ocean. In addition, two-dimensional plots were constructed showing vertical and latitudinal oceanic isotopic distributions for five time-slices in the Paleogene and Early Neogene. This set of reconstructions provides a comprehensive record of Paleogene and Early Neogene deep-water paleoceanography of the Indian Ocean. Important changes include gradual warming of deep waters from the Late Paleocene (60 Ma) to Early Eocene (55 Ma) followed by long-term, stepwise cooling through the Eocene. The flux of cooler bottom waters, presumably from the marginal seas of Antarctica, intensified in Early Oligocene time and then again in Middle Miocene time. (Auth. mod.)

E-52113

Kidd, R.B., et al, **Indian Ocean framework for paleoceanographic synthesis based on DSDP and ODP results,** *American Geophysical Union. Geophysical monograph series,* 1992, No.70, Synthesis of results from scientific drilling in the Indian Ocean. Edited by R.A. Duncan, D.K. Rea, R.B. Kidd, U. von Rad, and J.K. Weissel, p.403-422, Refs. p.420-422.

DLC QE350.5.I52

The stratigraphic phase of the paleoceanographic Indian Ocean synthesis project (PALIOS) has established a rigorous framework for paleoceanographic synthesis of both DSDP and ODP results. Most importantly, the authors have completed an integrated stratigraphic framework that allows correlation between the low and high latitudes and takes account of the existence of diachronous fossil datums. A simple spreadsheet routine has been developed to calculate the depth/age curve for each site which in turn provides the basis for assigning an age to each sample/measurement point. This has become the basis for a number of target projects that will culminate in time series palinspastic maps showing accumulation rates and paleobathymetry. Preliminary results of two of the target projects suggest that hiatuses linked to bottom water circulation could be more regionalized than previously thought. Whilst volcanogenic sediment input appears most closely linked to the evolution of "hotspots", the resulting distributions are controlled by dispersal mechanisms that include paleowinds and surface water mass circulation. (Auth.)

E-52114

Ehrmann, W.U., et al, **History of antarctic glaciation: an Indian Ocean perspective,** *American Geophysical Union. Geophysical monograph series,* 1992, No.70, Synthesis of results from scientific drilling in the Indian Ocean. Edited by R.A. Duncan, D.K. Rea, R.B. Kidd, U. von Rad, and J.K. Weissel, p.423-446, Refs. p.444-446.

DLC QE350.5.I52

Legs 119 and 120 of the Ocean Drilling Program cored 16 sites on a S-N transect from the antarctic continental shelf of Prydz Bay to the northern Kerguelen Plateau in the Indian Ocean. Thick sequences of glacigenic sediments were recovered in Prydz Bay, whereas the record on Kerguelen Plateau consists mainly of pelagic and, in part, glaciomarine sediments. This paper is a summary of the principal scientific results from the two legs that were concerned with the Cenozoic glacial and climatic history of Antarctica. It integrates a wide range of investigations, such as sedimentological studies including clay sedimentology and ice-rafted debris, studies of the oxygen isotopic composition of planktonic and benthic foraminifers, and paleontological investigations. Data obtained indicate that a long-term cooling trend started at about 52 Ma, after the thermal maximum in early Eocene time. From Oligocene to recent time, the ice sheet experienced several major advance and retreat phases, some of them being quite rapid and short-term. However, although no clear evidence was found for a disappearance of the ice as postulated from other parts of Antarctica, the fragmentary nature of the stratigraphic record may hide major recessions of the ice sheet from the coast. (Auth. mod.)

E-52115

Fielding, C.R., Webb, J.A., **Sedimentology of the Permian Radok Conglomerate in the Beaver Lake area of MacRobertson Land, East Antarctica,** *Geological magazine,* Jan. 1995, 132(1), p.51-63, 26 refs.

The mid- to Upper Permian Radok Conglomerate, which crops out in the Beaver Lake area of the northern Prince Charles Mountains, consists of interbedded conglomerates, argillaceous sandstones, siltstones, and minor thin carbonaceous siltstones and coals. Textural, petrographic, palaeocurrent and other data suggest local derivation from Precambrian massifs to the immediate west, during a period of fault activity. The unit is a minimum of 400 m thick, the base being unexposed, and grossly fines upward. Seven recurrent lithofacies have been recognized with the Radok Conglomerate, and are interpreted as the products of poorly-confined stream flow, sheet flow and sediment gravity flow processes, suspension fallout in shallow standing water, and organic sediment accumulation in peat-forming wetlands. The unit as a whole is interpreted as having accumulated as a coarse alluvial apron along the western margin of a graben extensional trough. Similar, though poorly exposed, facies are exposed on the eastern margin of the basin and may reflect similar depositional systems. Towards the top of the Radok Conglomerate, typical Radok lithologies are interbedded with quartzo-feldspathic sandstones derived from the south, precursors of the overlying Bainmedart Coal Measures. (Auth. mod.)

E-52119

Filkorn, H.F., **Fossil scleractinian corals from James Ross Basin, Antarctica,** *American Geophysical Union. Antarctic research series,* 1994, Vol.65, 96p., Refs. p.84-96.

Sixteen scleractinian species are known from the Upper Cretaceous and Paleocene strata of Seymour and Snow Hill islands based upon all types and newly collected material; 9 of the 16 species are described as new. Seven of those 9 new species are referred to the Turbinoliidae; 4 genera of Turbinoliidae also are established as new. The 16 scleractinian species are listed and, with the exception of four, are the earliest biostratigraphic occurrences known for their respective genera. The turbinoliid fauna from the López de Bertodano Formation is the most generically diverse turbinoliid assemblage known from Upper Cretaceous rocks; the fungiacyathids from the same formation represent the first unequivocal Mesozoic occurrences of their family. In addition, 12 of the 16 species represent the highest southern latitude occurrences known for their respective genera. The specimens of *Madrepora sobral* from the Sobral Formation (Paleocene) of Seymour I. are both the earliest biostratigraphic and highest southern latitude occurrences known for this genus. (Auth. mod.)

E-52123

Ishikawa, M., Shiraishi, K., Motoyoshi, Y., Tsuchiya, N., Shimura, T., Yanai, K., **Explanatory text of geological map of Ongul Islands, Lützow-Holm Bay, Antarctica,** *Tokyo. National Institute of Polar Research. Antarctic geological map series,* Mar. 1994, Sheet 36, 21p. + 4 plates + map, Refs. p.17-21.

A geological map of Ongul I. is presented on a 1:10,000 scale, with one location diagram and legend for petrological and geomorphological data. The general geology of the area, the metamorphic rocks, pegmatites, geological structure and geochronology are discussed in the accompanying text. Chemical analyses of the rocks are tabulated.

E-52138

Hofmann, J., **Fault tectonics and magmatic ages in the Jetty Oasis area, Mac. Robertson Land: a contribution to the Lambert Rift development** [Bruchtektonik und Magmatismus im Gebiet der Jetty-Oase, Mac. Robertson Land (Ostantarktika): Ein Beitrag zur Entwicklung des Lambert-Riftes], *Freiberger Forschungshefte,* 1991, No.C438, 38p., In German with English summary. 37 refs.

For an earlier, condensed version of this paper and abstract, as presented during the 5th International Symposium on Antarctic Earth Sciences, at Cambridge, UK, in Aug. 1987, see 19E-43973 and 19E-43991.

E-52151

Kelm, U., Hervé, F., **Illite crystallinity of metapelites from the Trinity Peninsula Group, Lesser Antarctica: some implications for provenance and metamorphism,** *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1994, No.44, p.9-16, With Spanish summary. Refs. p.14-16.

Illite crystallinity was analyzed in 19 samples of pelitic rocks from the Trinity Peninsula Group at 5 different localities in the northern Antarctic Peninsula and Livingston I. A variation in metamorphic grade from lower anchizone on Livingston I. to upper anchizone-greenschist facies at Cape Legoupil was observed; rocks from Hope Bay, View Point and Spring Point indicate upper anchizone grade. White mica b_0 determinations at Cape Legoupil indicate medium pressure conditions of metamorphism. Mineralogical composition of the <2 microns size fraction varies geographically, indicating variable composition of the source area of the sediments. However, these sources probably had abundant basic greenschist facies rocks, rich in chlorite, as an important constituent. (Auth.)

E-52152

Torres, T., Marenssi, S.A., Santillana, S.H., **Fossil wood of Seymour I., La Meseta Formation, Antarctica** [Maderas fósiles de la isla Seymour, Formación La Meseta, Antártica], *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1994, No.44, p.17-38, In Spanish with English summary. Refs. p.35-38.

Tertiary fossil woods found at La Meseta Formation in Seymour I. are identified. The macroflora is composed of 5 coniferous species: *Araucarioxylon novaezelandae* Stopes, *A. pseudoparenchymatosum* Gothan; *A. seymourense* Torres, *Cupressinoxylon seymourense* Torres, *Phyllocladoxylong antarcticum* Gothan and one dicotyledoneus wood, *Nothofagoxylon scalariforme* Gothan. The 6 taxa identified, 3 of which are cited for the first time, have affinities with present trees that grow in forest areas of temperate cold rainy climates with differential seasons. A similar palaeoclimate is inferred for the deposits from Seymour I. in the Eocene-Oligocene. The conditions of the deposit are discussed; it is concluded that petrification occurred in a carbonate rich medium. The woods would have floated in the sea, being deposited in a protected zone, probably in a bay. These fossil woods come from well-defined levels of Eocene-Oligocene age from La Meseta Formation and can be used as guides in stratigraphic correlations with southern South American areas and antarctic localities in which similar tertiary woods have been found. (Auth.)

E-52162

Hunter, D.R., **South African geosciences in Antarctica: the third decade,** *South African journal of geology,* Dec. 1993, 96(4), p.162-181, With Afrikaans summary. Refs. p.179-181.

Earth science research by South African expeditions to Antarctica began in Dec. 1959. The third decade of South African research has been built on the foundation of knowledge laid by previous expeditions. Emphasis has moved to specific research topics rather than broad regional studies. Petrological and structural studies of magmatic, metamorphic, and sedimentary rocks have enabled refinements to be made to the reassembly of Gondwana. Airborne geophysical studies have identified magnetic anomalies similar to those recognized in South Africa. These studies have provided new insights into the assembly of crustal blocks in the Precambrian. The results of geological and geophysical research are summarized and discussed in relation to the problems of crustal evolution and the existence of supercontinents during the Proterozoic. (Auth. mod.)

E-52166

Nakanishi, A., **Thermoluminescence study of the terrestrial ages of antarctic meteorites,** *Radiation measurements,* Apr.-July 1994, 23(2-3), International Specialist Seminar on Thermoluminescence and Electron Spin Resonance Dating, 7th, Krems, Austria, July 5-9, 1993, p.405-408, 10 refs.

The terrestrial ages of antarctic meteorites were estimated from the thermoluminescence (TL) intensity of the fusion crust. It was found that there is a strong correlation between the TL intensities and terrestrial ages which had been previously determined by cosmogenic radionuclide abundance. (Auth. mod.)

E-52174

Becker, R.H., Pepin, R.O., **Nitrogen and noble gases in a glass sample from the LEW88516 shergottite,** *Meteoritics,* Dec. 1993, 28(5), p.637-640, 20 refs.

A glass separate from the LEW88516 shergottite was analyzed by stepwise combustion for N and noble gases to determine whether it contained trapped gas similar in composition to the martian atmosphere-like component previously observed in lithology C of EETA79001. Excesses of ^{40}Ar and ^{129}Xe were in fact observed in this glass, although the amounts of these excesses are ≤20% of those seen in the latter meteorite, and are comparable to the amounts seen in whole-rock analyses of LEW88516. The isotopic composition of N in LEW88516 does not show an enrichment in δ^{15}N commensurate with the amount of isotopically-heavy N expected from the noble gases excesses. One must posit some extreme assumptions about the nature of the N components present in LEW88516 in order to allow the presence of the trapped nitrogen component. Alternatively, the N has somehow been decoupled from the noble gases, and was either never present or has been lost. (Auth.)

E-52179

McNamara, K.J., **Diversity of Cenozoic marsupiate echinoids as an environmental indicator,** *Lethaia,* Sep. 1994, 27(3), p.257-268, 45 refs.

Marsupiate echinoids are today largely confined to the seas around Antarctica. Consequently, it has often been inferred that the presence of marsupiate echinoids in the fossil record is indicative of the former existence of low oceanic temperatures. In this study the distribution of marsupiate echinoids through the Cenozoic succession of southern Australia is compared with palaeotemperature data to test this assumption. The analysis reveals no positive correlation between high maruspiate echinoid diversity during the Cenozoic and low oceanic temperatures. An alternative hypothesis, based on life-history strategies, is investigated. This reveals that marsupiate echinoids show many characteristics typical of organisms with slow growth, long life spans and production of few, large offspring. It is suggested that the northward migration of Australia during the Cenozoic from an original high-latitude location in the early Cenozoic was accompanied by an increase in environmental instability in the southern Australian region in the late Cenozoic. This led to a consequent decrease in maruspiate echinoid diversity. (Auth. mod.)

E-52191

Olivero, E.B., Aguirre-Urreta, M.B., **New tube-builder hydractinian, symbiotic with hermit crabs, from the Cretaceous of Antarctica,** *Journal of paleontology,* Nov. 1994, 68(6), p.1169-1182, 80 refs.

An Upper Cretaceous tube-building hydractinian from Sanctuary Cliffs, Snow Hill I., believed to live in association with hermit crabs, is described for the first time from Antarctica. *Psammoactinia* forms thick, concentric, globular colonies that encrust gastropod shells and extend the shell aperture by forming an open spiral tube. The colony consists of concentric layers with chambers and pillars made of silt and very fine sand grains agglutinated by collophane, which is interpreted as a diagenetic modification of an original chitinous phosphatic material. On the basis of the additional finding of isolated claws of pagurid crabs, assigned to *Paguristes* sp., the functional analysis of the hydractinian structure, and a comparison with modern and fossil analogous structures, it is concluded that the peculiar hydractinian tube is a carcinoecium that housed a symbiotic hermit crab. Paleoenvironmental and paleoecological inferences suggest that the *Psammoactinia-Paguristes* association is mainly controlled by a fine-grained substrate and by a lack of abundant gastropod shells of different sizes. (Auth. mod.)

E-52193

Beike, D.K., **Technical design and economics of antarctic offshore petroleum development,** Offshore Technology Conference, 26th, Houston, TX, May 2-5, 1994. Proceedings. Vol.2, 1994, p.339-348, 24 refs.

Major considerations for antarctic petroleum development are discussed. A hypothetical technical development scheme is described and an economic evaluation is performed. If a petroleum reserve is defined as existing when a mineral deposit is legally, technically and economically feasible to develop, then no antarctic petroleum development will occur in the near future. No petroleum has yet been found, no production structure exists to operate in this environment, unfavorable economic conditions prevail and no mineral regime exists that would allow such development for at least the next fifty years. (Auth. mod.)

E-52207

Baumiller, T.K., Gaździcki, A., **Crinoids from the lower part of the La Meseta Formation (Eocene), Antarctica,** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.9-13, 11 refs.

The authors suggest that any new discoveries of Cenozoic crinoid fossils are of great value not only for increasing the sparse record of this group, but also for helping resolve the timing of biogeographic, ecological, and phylogenetic events. Here they report on specimens representing three of the five extant orders, the isocrinids, the cyrtocrinids, and the comatulids, retrieved from the lower part of the La Meseta Formation, Seymour I.

E-52208

Birkenmajer, K., **Character and age of the Gondwanian unconformity in northern Antarctic Peninsula,** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.25-27, 16 refs.

The main Mesozoic unconformity in the northern Antarctic Peninsula occurs between the folded siliciclastic marine turbidite deposits of the Trinity Peninsula Group (TPG: ?Permian-Triassic) and the terrestrial plant-bearing alluvial-fan to lacustrine deposits of the Mount Flora Formation (MFF: Middle-Upper Jurassic) at Mount Flora, Hope Bay. This is an angular unconformity, evident from different attitudes of the folded TPG strata which dip at 20-30° due west, and the overlying MFF strata which dip at 40-50° due south; however the contact itself is not exposed. The folding of the Hope Bay Formation, and the subsequent erosion of its deposits, took place probably close to the Triassic/Jurassic boundary as a result of the Gondwanian Peninsula Orogeny. The author proposes to distinguish this folding as the Trinity phase (?late Triassic).

E-52209
Hara, U., **Bryozoan assemblage from the Lower Miocene Cape Melville Formation of King George Island, West Antarctica,** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.31-32 + 3 plates, 10 refs.

The bryozoan fauna of anascan Cheilostomata which is represented by the two genera *Cellaria* and *Aspidostoma* was collected from the uppermost part of the Lower Miocene fossiliferous glacio-marine sediments of the Cape Melville Formation at Cape Melville on King George I. *Cellaria* Ellis and Solander, 1786 which is represented by single slender cylindrical internodes up to 1.6 mm long and to about 0.6 mm in diameter is the predominant bryozoan constituent in the sediments of the Cape Melville Formation. The second taxon, *Aspidostoma* Hincks, 1881 builds bilamellar foliaceous colonies. Its thick and broad leaf-like branches reach a length of 3.5 cm. Both taxa are reported for the first time from the Cape Melville Formation.

E-52210
Marenssi, S.A., Santillana, S.N., **Unconformity bounded units within La Meseta Formation, Seymour Island, Antarctica: a preliminary approach,** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.33-37, 8 refs.

Seymour I. is a small ice-free island located close to the northern tip of the Antarctic Peninsula. Here more than 2 cm of Maastrichtian to Upper Eocene sediments crop out. The Eocene La Meseta Formation is an unconformity-bounded unit that comprises more than 700 m of shallow-marine silts, sands and shelly conglomerates. This unit was initially subdivided into 3 informal members representing different parts of a tide-dominated prograding delta complex. Lately, 7 lenticular main lithofacies with 7 subunits were recognized within the La Meseta Formation, but no sedimentological interpretation of them has been proposed. Based on extensive and detailed field work, the authors have identified 7 distinct erosional surfaces of bounding discontinuities which allows them to divide the La Meseta Formation into 6 allomembers.

E-52211
Tambussi, C.P., Noriega, J.I., Gaździcki, A., Tatur, A., Reguero, M.A., Vizcaíno, S.F., **First occurrence of Ratite bird in the Paleogene of Antarctica,** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.45-48, 7 refs.

Recent field work during the joint Argentine-Polish Field Party (summer of 1993-94) on Seymour I. yielded a fossil bird bone from Tertiary sediments of the La Meseta Formation assignable to ratites (Palaeognathae); this represents the first record of this group of flightless birds from Antarctica. The discovery reported here strongly supports the notion that West Antarctica was used as an antarctic dispersal route by obligate terrestrial forms of ratites during the Mesozoic and early Paleogene, thus connecting different Gondwanian fragments.

E-52212
Vizcaíno, S.F., Reguero, M.A., Marenssi, S.A., Santillana, S.N., **Fossil record of land mammals from Antarctica,** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.49-54, With Spanish summary. 17 refs.

The record of South American mammals of West Antarctica suggests a high diversity during the Paleogene, and a close biogeographic relation with Patagonian faunas. The new specimens described in this study further reinforce such interpretations.

E-52221
Zale, R., **^{14}C age corrections in antarctic lake sediments inferred from geochemistry**, *Radiocarbon,* 1994, 36(2), p.173-185, 27 refs.

Sediment from Lake Boeckella, Antarctic Peninsula, is richer in Ca, Cd, Cu, P, Sr and Zn than that of six other lakes in the area. The elements originate from Adélie penguin guano on the lake shores. Changing Cu and P concentrations in the lake sediment are used as a proxy for penguin influence on the lake sediment from *ca.* 5850 BP to present. A ^{14}C dating model suggests that the ^{14}C correction factor in the lake sediments depends on the penguin proxy, the apparent age of the penguin guano and the amount of particulate carbon originating from the carbon-bearing shales in the watershed. Glacial meltwater and dissolved carbonates do not contain enough “old” carbon to contribute significantly to the correction factor. Ages corrected with the ^{14}C dating model agree with the depth vs. age curve based on independently ^{14}C-dated tephra horizons. The reservoir effect has been constant since at least 5800 BP, implying long-term stability of the currents and water masses in the area. (Auth. mod.)

E-52222
Operto, S., Charvis, P., **Kerguelen Plateau: a volcanic passive margin fragment?,** *Geology,* Feb. 1995, 23(2), p.137-140, 20 refs.

The 21-25 km-thick crust of the southern Kerguelen Plateau consists of three units: (1) a≤2.3 km-thick sedimentary cover; (2) a 3-6 km-thick basaltic layer with velocities ranging from 4.5 to 6.2 km/s; and (3) a 15-17 km-thick lower crust with velocities from 6.6 to 6.9 km/s, including a 3-6 km-thick transition zone located at the base of the crust. The low-velocity transition zone has an average velocity of 6.7 km/s and exhibits several internal wide-angle reflections. The velocity-depth structure of the crust differs significantly from that of other hotspot-related oceanic plateaus, suggesting that the southern Kerguelen Plateau may be a fragment of a volcanic passive margin composed of a thinned continental crust overlain by basalt flows. (Auth. mod.)

E-52225
Krylov, D.P., Mineev, S.D., **Concept of model-temperature in oxygen isotope geochemistry: an example of a single outcrop from the Rayner Complex (Enderby Land, East Antarctica),** *Geochimica et cosmochimica acta,* Oct. 1994, 58(20), p.4465-4473, 52 refs.

Oxygen isotope distribution among rocks of different lithologies from one outcrop of the polymetamorphic Rayner Complex (East Antarctica) was used to estimate the “model temperatures” (T_m), which correspond to the change of fluid behavior from the large-scale migration to small-scale exchange (open-system vs. closed-system) during waning stages of regional metamorphism. T_m values are deduced assuming (1) isotopically homogeneous fluid before isolation of a sample-scale system from its surroundings, and (2) mass-balance control of the fluid isotopic composition after the isolation. An estimated T_m of about 720°C fits data on cationic geothermometers and equals the peak conditions of the “Major Rayner” event. Conventional oxygen geothermometry, applied to the same samples, gives equilibrium temperatures that are generally lower (down to 565°C), though the local-scale oxygen transport among minerals mostly caused disequilibrium in isotope distribution. (Auth. mod.)

E-52229
Larter, R.D., Vanneste, L.E., **Relict subglacial deltas on the Antarctic Peninsula outer shelf,** *Geology,* Jan. 1995, 23(1), p.33-36, 30 refs.

The first deep-tow boomer survey on the antarctic continental margin has revealed relict subglacial deltas on the outer continental shelf off the Antarctic Peninsula. Progradation of subglacial deltas is thought to take place at the grounding lines of ice streams which flow on deforming subglacial till. Acoustic characteristics and estimation of likely sediment transport rates suggest that these features were produced by late-stage readvance of grounding lines during the waning of the last ice sheet that covered the shelf. This readvance could have taken place during the Younger Dryas (12.9-11.6 ka), but changes in sea level and climate may not be the only important controls on subglacial delta formation. The discovery of relict subglacial deltas on the outer shelf is consistent with the hypothesis that the grounded ice sheet in these areas was low profile and fast flowing. If low-profile grounded ice extended to the shelf edge in many places around Antarctica at times of glacial maximum, this could explain the greater glacial maximum ice-sheet extent in interpretations based on offshore data, compared with reconstruction based on onshore data and numerical glaciological models. (Auth. mod.)

E-52238

Domack, E.W., Mammone, K.A., **Modern sedimentation within Andvord Bay, Antarctic Peninsula,** *Antarctic journal of the United States,* 1993, 28(5), p.97-98, 1 ref.

To assess the modern sedimentation regime within Andvord Bay, the authors deployed sediment traps for a 5-month period (from mid-Oct. to mid-Mar.). A moored system of three funnel-shaped sediment traps, each with a collection area of 0.8018 m^2, was deployed for 159 days in Andvord Bay. Sediment traps were deployed at depths of 230, 397, and 441 m over a bottom depth of 450 m. Traps were not deployed at any depths shallower than 230 m so as not to be disturbed by icebergs. Trap material was analyzed for sand and gravel content, total organic carbon, and biogenic silica.

E-52239

Keller, R.A., Strelin, J.A., Lawver, L.A., Fisk, M.R., **Dredging young volcanic rocks in Bransfield Strait,** *Antarctic journal of the United States,* 1993, 28(5), p.98-100, 7 refs.

In Feb. and Mar. 1993, cruise 93-1 of the R/V *Nathaniel B. Palmer* spent several days in Bransfield Strait, including 2.5 days of dredging. The authors attempted 10 dredges on 8 bathymetric targets thought to be of recent volcanic origin, and recovered fresh volcanic rocks in 8 of those dredges. Fragments of basalt pillows and flows are the most common forms of sample recovered, followed by rubbly chunks of basalt. Most samples have at least one glassy surface and contain 20 to 40% vesicles. Phenocrysts are rare but include small plagioclase, olivine, and clinopyroxene. All but one of the dredges also contained rounded glacial erratics that were obviously ice-rafted from the South Shetland Is. and the Antarctic Peninsula.

E-52240

Barker, D.H.N., Austin, J.A., Jr., ***EW91-01*: New multichannel seismic results from Bransfield Strait, Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.101-102, 5 ref.

Listric normal faulting is observed on the Antarctic Peninsula margin of Bransfield Strait. In general, the peninsula margin faulting undergoes a complex evolution along strike, with numerous changes in polarity and direction of apparent block rotation. The South Shetland Is. basin margin also shows seismic evidence for large-offset normal faults. A neovolcanic ridge, which runs along the deep basin axis connecting the active volcanoes of Deception I. to the southwest with Bridgeman I. to the northeast, is well-defined but shows apparent complex sill intrusions into adjacent and overlying sediment. There are also preliminary indications of flexural loading of preexisting crust by these basin volcanics.

E-52241

Klepeis, K.A., Lawver, L.A., **Bathymetry of the Bransfield Strait, southeastern Shackleton Fracture Zone, and South Shetland Trench, Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.103-105, 3 refs.

In Feb. 1991, a detailed multichannel seismic survey of the complex tectonic regimes around the Antarctic Peninsula and South Shetland Is. was completed by R/V *Maurice Ewing.* This cruise produced about 2,000 km of new Hydrosweep data of the Bransfield Strait, the South Shetland Trench and the Shackleton Fracture Zone. The authors have compiled the bathymetric data collected during all these investigations to generate a 100 m contour bathymetric chart of this complex tectonic region.

E-52244

Boersma, A., Huber, B., **Origins and biogeography of Cretaceous/Tertiary biserial planktonic foraminifera in the southern oceans,** *Antarctic journal of the United States,* 1993, 28(5), p.109.

Latest Cretaceous/early Tertiary biserial planktonic foraminifera are being studied because their distributions and abundances may provide information on paleoproductivity in the Antarctic. Biogeographic partitioning of these planktonic foraminifera depicts differing surface water mass conditions between the Atlantic Ocean and Indian Ocean sectors of the southern ocean. Biserial planktonic foraminifera demonstrate biogeographic provincialization and migratory diachroneity not only between temperate and subtropical latitudes, but also within the austral realm. The Cretaceous zeauvigerinids are more abundant in the Indian Ocean sector of the Antarctic. First recorded over the Kerguelen Plateau, they soon spread to the Weddell Sea, then in the Paleocene migrated to the subantarctic Atlantic Falkland Plateau region.

E-52245

Burckle, L.H., Rudolph, S., Mortlock, R.A., **Evidence for an Early Pliocene cold event in the southern oceans,** *Antarctic journal of the United States,* 1993, 28(5), p.110-111, 13 refs.

In this study of brief, intense warm events in the Early Pliocene, the authors encountered evidence for at least one major glaciation during this time interval. They measured the percentage of carbonate, the percentage of opal, and the $(Ge/Si)_{opal}$ for the Lower Pliocene sequence of hole 737A. A figure shows the results of this study; because the percentage of carbonate was generally low through this interval, it is not shown. The percentage of opal, on the other hand, is generally high, ranging between 50 and 60%. Between approximately 40 to 60 m depth, the percentage concentration of opal drops to almost 20%. This drop is accompanied by a change in $(Ge/Si)_{opal}$ from a high of 0.80 to a low of 0.50. This event occurs between the Nunivak and Sidufjall subchrons of the Gilbert chron and is tentatively dated at about 4.5 mya. Using the criteria stated above, the authors interpret this to be a glacial event.

E-52283

Li, S.K., **Preliminary study on aeolian landforms in the Larsemann Hills, East Antarctica,** *Antarctic research (Chinese edition),* Dec. 1994, 6(4), p.23-31, In Chinese with English summary. 5 refs.

The Larsemann Hills are ice free and were formed in the Holocene. They consist of a series of rocky peninsulas and islets in Prydz Bay. The most obvious geomorphic process is aeolian. Physical weathering is evident. The intensity and frequency of the wind are very high. The high-speed air flow is not saturated with sand and snow grains. It restricts the aeolian sedimentary and erosion process and is responsible for the characteristics of aeolian landforms. Aeolian sedimentation consists of barrier and standstill sedimentary processes. They mainly form 3 types of landforms: snow blanket, sand drift and gravel dyke. Some of the landforms are special and only form in the cold polar environment. The geochemical parameters of aeolian sediments are very similar to those of the bedrock. (Auth. mod.)

E-52285

Li, G., Sun, J.B., **Preliminary study on the automatic taxonomy of rock in the Mirror Peninsula of the Larsemann Hills, East Antarctica, by TM data,** *Antarctic research (Chinese edition),* Dec. 1994, 6(4), p.37-42, In Chinese with English summary. 7 refs.

Using the Maximum Likelihood Method and TM data, the authors determined the automatic taxonomy of rocks from Larsemann Hills. Five kinds of rock were identified: gneissic leucogranite, syenogranite, high-Al-Fe-gneisses, migmatite, and striped migmatite. At 82% reliability, the method used is found to be economic and efficient. The prospects for satellite-borne polar remote sensing development in geology are found to be good. (Auth. mod.)

E-52308

Claridge, G.G.C., Campbell, I.B., Powell, H.K.J., Amin, Z.H., Balks, M.R., **Heavy metal contamination in some soils of the McMurdo Sound region, Antarctica,** *Antarctic science,* Mar. 1995, 7(1), p.9-14, 10 refs.

Soil samples from eight sites at Marble Point and Pram Point, McMurdo Sound region contaminated by human activities were examined for heavy metal content, using sequential extraction methods. The redistribution of lead, zinc and copper arising from point sources of these metals was demonstrated. The levels found are not considered to represent serious pollution but do indicate that human activities can change the chemistry of the antarctic environment in localized areas. (Auth.)

E-52314

Cantrill, D.J., Drinnan, A.N., Webb, J.A., **Late Triassic plant fossils from the Prince Charles Mountains, East Antarctica,** *Antarctic science,* Mar. 1995, 7(1), p.51-62, Refs. p.61-62.

Megafloral remains recovered from the Jetty Member and the upper part of the Flagstone Bench Formation, Amery Group include *Dicroidium* and *Pagiophyllum. Dicroidium zuberi* and *D. crassinervis* forma *stelznerianum* occur with *Pteruchus dubius* and support a Mid- to Late Triassic age. A new species of conifer, *Pagiophyllum papillatus,* is recognized along with an undetermined conifer pollen cone. (Auth.)

E-52315

So, C.S., Yun, S.T., Park, M.E., **Geochemistry of a fossil hydrothermal system at Barton Peninsula, King George Island,** *Antarctic science,* Mar. 1995, 7(1), p.63-72, Refs. p.71-72.

A fossil hydrothermal system on Barton Peninsula has formed a series of lead-zinc- and pyrite + native sulphur-bearing epithermal quartz±calcite veins, filling fault-related fractures in hydrothermally altered volcanic rocks of Eocene age. The lead-zinc veins occur within argillic hydrothermal alteration zones, whereas the pyrite + native sulphur veins are found within advanced argillic alteration zones. Fluid inclusion data indicate that the vein formation occurred at temperatures between about 125° and 370°C from fluids with salinities of 0.5-4.6 wt. % eq. NaCl. Equilibrium thermodynamic interpretation of mineral assemblages indicates that the deposition of native sulphur in the upper and central portions of the hydrothermal system was a result of the mixing of condensates of ascending magmatic gases and meteoric water. This yielded fluids which had lower pH (<3.5) and higher fugacities of oxygen and sulphur than the lead-zinc-depositing fluids at depth. (Auth. mod.)

E-52316

Morrison, A.D., Reay, A., **Geochemistry of Ferrar Dolerite sills and dykes at Terra Cotta Mountain, south Victoria Land, Antarctica,** *Antarctic science,* Mar. 1995, 7(1), p.73-85, Refs. p.84-85.

At Terra Cotta Mountain in the Taylor Glacier region, a 237 m thick Ferrar Dolerite sill is intruded along the unconformity between basement granitoids and overlying Beacon Supergroup sedimentary rocks. Numerous Ferrar Dolerite dykes intrude the Beacon Supergroup and represent later phases of intrusion. Major and trace element data indicate variation both within and between the separate intrusions. Crystal fractionation accounts for much of the geochemical variation between the intrusive events. Large ion lithophile element-enrichment and depletion in Nb, Sr, P and Ti suggests the addition of a crustal component or an enriched mantle source. The trace element characteristics of the Dolerites from Terra Cotta Mountain are similar to those of other Ferrar Group rocks from the central Transantarctic Mountains and north Victoria Land, as well as with the Tasmanian Dolerites. This supports current ideas that the trace element signature of the Ferrar Group is inherited from a uniformly enriched mantle source region. (Auth. mod.)

E-52317

Moyes, A.B., Krynauw, J.R., Barton, J.M., **Age of the Ritscherflya Supergroup and Borgmassivet Intrusions, Dronning Maud Land, Antarctica,** *Antarctic science,* Mar. 1995, 7(1), p.87-97, Refs. p.96-97.

Western Queen Maud Land comprises a relatively undeformed, unmetamorphosed sequence of sedimentary-volcanogenic rocks, the Ritscher Upland Supergroup, intruded by a suite of continental tholeiites, the Borg Massif Intrusions. New Rb-Sr and Sm-Nd whole rock data indicate a depositional age of ≈1080 Ma. These rocks are interpreted as a molasse-type deposit following the Kibaran orogeny at 1200-1100 Ma. The Ritscher Upland Supergroup is intruded by the Grunehogna and Kullen sills; the ≈1000 Ma Grunehogna sill intruded unconsolidated sediments, causing partial melting of the sediments. Rb-Sr data from the Kullen sill yield an age of 1429 Ma. Combined Sr and Nd data are compatible with crustal contamination of this sill, producing an Rb-Sr pseudo-isochron with no geological age significance. By comparison with other outcrops of the Borg Massif Intrusions it is concluded that contamination and pseudo-isochrons may be responsible for the wide range in reported ages older than 1000 Ma. Nd model age data indicate that all rock types were ultimately derived from material separated from a depleted mantle source at ≈2200 Ma. (Auth. mod.)

E-52318

Smellie, J.L., Liesa, M., Muñoz, J.A., Sàbat, F., Pallàs, R., Willan, R.C.R., **Lithostratigraphy of volcanic and sedimentary sequences in central Livingston Island, South Shetland Islands,** *Antarctic science,* Mar. 1995, 7(1), p.99-113, Refs. p.111-113.

Livingston I. contains several distinctive sedimentary and volcanic sequences. The turbiditic, Late Palaeozoic-Early Mesozoic Miers Bluff Formation (MBF) is divided into the Johnsons Dock and Napier Peak members. The Moores Peak breccias are formed largely of coarse clasts reworked from the MBF. The breccias may be part of the MBF, a separate unit, or part of the Mount Bowles Formation. The structural position is similar to the terrigenous Lower Jurassic Botany Bay Group in the northern Antarctic Peninsula, but the precise stratigraphical relationships and age are unknown. The (?)Cretaceous Mount Bowles Formation is largely volcanic. Detritus in the volcaniclastic rocks was formed mainly during phreatomagmatic eruptions and redeposited by debris flows (lahars), whereas rare sandstone interbeds are arkosic and reflect a local provenance rooted in the MBF. The Pleistocene-Recent Inott Point Formation is dominated by multiple basaltic tuff cone relicts in which distinctive vent and flank sequences are recognized. (Auth. mod.)

E-52319

McMinn, A., Harwood, D., **Biostratigraphy and palaeoecology of early Pliocene diatom assemblages from the Larsemann Hills, eastern Antarctica,** *Antarctic science,* Mar. 1995, 7(1), p.115-116, 12 refs.

The object of this note is to document and reassess a marine Pliocene diatom assemblage from the Larsemann Hills and to discuss its significance with respect to other antarctic Neogene deposits. A figure shows that diatom preservation in all samples is extremely poor due to the high degree of fragmentation. Few unfragmented specimens were found and many taxa are represented only by small fragments. Assemblage composition is documented in a table, with some of the age diagnostic species illustrated in a figure.

E-52343

Scorzelli, R.B., Pereira, R.A., Perez, C.A.C., Fernandes, A.A.R., **Phase composition and structure of Fe-Ni alloys in a unique antarctic meteorite Yamato 791694,** *Hyperfine interactions,* Nov. 1994, 94(1-4), p.2343-2347, 7 refs.

Phase composition and structure of iron-nickel alloys in the antarctic meteorite Y-791694 are discussed and compared to other non-antarctic Ni-rich ataxites using results obtained by Mössbauer spectroscopy, X-ray diffraction and other techniques. (Auth.)

E-52344

Fielding, C.R., Webb, J.A., **Sedimentology of the Permian Radok Conglomerate in the Beaver Lake area of Mac. Robertson Land, East Antarctica,** *Geological magazine,* Jan. 1995, 132(1), p.51-63, 26 refs.

The mid- to Upper Permian Radok Conglomerate, the lowermost formation of the Permo-Triassic Amery Group, crops out in the Beaver Lake area of the northern Prince Charles Mountains, East Antarctica.

This basin forms a small part of the much larger Lambert Graben, a major continental rift system. The Radok Conglomerate consists of interbedded conglomerates, argillaceous sandstones, siltstones, and minor, thin carbonaceous siltstones and coals. Textural, petrographic, paleocurrent and other data suggest local derivation from Precambrian massifs to the immediate west, during a period of fault activity. Seven recurrent lithofacies have been recognized with the Radok Conglomerate, and are interpreted as the products of poorly-confined stream flow, sheet flow and sediment gravity flow processes, suspension fallout in shallow standing water, and organic sediment accumulation in peat-forming wetlands. (Auth mod.)

E-52347

Angoulvant-Coulon, M.P., Schlich, R., **New tectonic direction on the Kerguelen Plateau** [Mise en évidence d'une nouvelle direction tectonique sur le plateau de Kerguelen], *Académie des sciences, Paris. Comptes rendus. Série II,* Oct. 20, 1994, 319(8), p.929-935, In French with abridged English version. 23 refs.

Oceanographic cruises carried out over the Kerguelen Plateau in the Indian Ocean during the last two decades provide new insight on the tectonic and geological evolution of this huge structure. The tectonic directions already identified are oriented northwest-southeast and north-south. *Marion-Dufresne* 67 seismic reflection data suggest a new east-west tectonic direction; its existence is confirmed by the gravimetric data converted from altimeter profiles collected during *ERS-1, SEASAT* and *GEOSAT* missions. These data and their interpretation allow the authors to update the tectonic map for the Kerguelen Plateau. (Auth.)

E-52396

Ehrendorfer, T., **Calcareous nannofossil species *Nephrolithus frequens* Górka (1957) and its morphotypes,** *Journal of paleontology,* Mar. 1994, 68(2), p.191-200, 14 refs.

A complete morphologic intergradation from biperforate to multiperforate specimens of *Nephrolithus frequens* Górka (1957) occurs in the uppermost Maastrichtian chalk at southern high-latitude ODP Holes 750A, Kerguelen Plateau, southern Indian Ocean and 690C, Maud Rise, Weddell Sea. Previous workers have assigned taxonomic importance to the number of pores of the central area. Two subspecies, *N. frequens* subsp. *frequens* and *N. frequens* subsp. *miniporus* were recently differentiated based on this character (four or more pores and two pores, respectively). The observation of specimens of *N. frequens* with three pores in the central area indicates that there is no "natural" breaking point in a progression from two to more numerous pores. Specimens of *N. frequens* with different pore numbers should therefore be considered morphotypes of a single species exhibiting a high intraspecific variability. In addition, observations using the scanning electron microscope and light microscope illustrate that in well-preserved specimens each pore in the central area is surrounded by two cycles of elements. The margin consists of two cycles, with the elements of the inner cycle extending proximally about twice as far as the elements of the outer cycle. (Auth. mod.)

E-52399

Kelly, S.R.A., **New trigonioid bivalves from the Early Jurassic to Earliest Cretaceous of the Antarctic Peninsula region: systematics and austral paleobiogeography,** *Journal of paleontology,* Jan. 1995, 69(1), p.66-84, 101 refs. A list of information on localities is provided.

New discoveries of trigonioid bivalves are documented from three areas in the Antarctic Peninsula: the Fossil Bluff Group of Alexander I., the Latady Formation of the Orville Coast, and the Byers Group of Livingston I., South Shetland Is. Eleven taxa are described, representing six genera or subgenera. The faunas are characterized by genera including *Vaugonia (Vaugonia),* the first Early Jurassic trigonioid recognized on the continent; *Vaugonia (V.)* and *V. (Orthotrigonia?)* in the Late Jurassic; and *Iotrigonia (Iotrigonia), Myophorella (Scaphogonia),* and *Pterotrigonia (Pterotrigonia),* which span the Jurassic-Cretaceous boundary, reaching the Berriasian stage. The following species are new: *Pterotrigonia (P.) cramei* n.sp., *Pterotrigonia (P.) thomsoni* n.sp., *Vaugonia (V.) orvillensis* n.sp. and *V. (Orthotrigonia?) quiltyi* n.sp. The faunas show affinities with those of New Zealand and southern Africa. (Auth.)

E-52400

Qin, D.H., Zielinski, G.A., Germani, M.S., Ren, J.W., Wang, X.X., Wang, W.T., **Use of tephrochronology in the evaluation of accumulation rates on Nelson Ice Cap, South Shetland Islands, Antarctica,** *Science in China. Series B,* Oct. 1994, 37(10), p.1272-1278 + 2 plates, 11 refs.

A volcanic ash layer was observed in 3 ice cores from Nelson Ice Cap. A comparison of major elemental composition of glass shards from the 3 tephra layers with average whole-rock compositions of 1967-1970 eruptions on Deception I., and of glass shards from other suspected Deception I. eruptions collected from antarctic ice and firn, indicate that the most reasonable source for the tephra in the Nelson Ice Cap cores is the 1970 eruption on Deception I. From the depth of the volcanic ash layer and measured density profile of the cores, the net accumulation rate at the summit, Core GW, is 1200 $g/cm^2/a$ during the past 20 years. The net accumulation rates are 700 $g/cm^2/a$ and 6 $g/cm^2/a$ at sites N30 and N50, respectively. In the eastern part of the Nelson Ice Cap the accumulation rate may be higher than that in the northern part, because no volcanic ash in ice cores was observed at similar depths collected from this region. (Auth.)

E-52402

Zachos, J.C., **From the greenhouse to the icehouse: a southern ocean perspective of Paleogene climate,** *Oceanus,* 1993/94, 36(4), p.57-61.

In 1985, with the initiation of *JOIDES Resolution* and the second phase of scientific drilling, scientists gained the capacity to drill in some of the more remote and inhospitable reaches of the world oceans, including the polar oceans. One immediate regional target was the southern ocean, where nearly 10 km of sediment were recovered at more than 25 sites during 4 legs of drilling. As a result of antarctic drilling it became evident that ice sheets were present on Antarctica as long ago as the earliest Oligocene. Thick sequences of glacially deposited debris found in Prydz Bay, together with similar deposits found earlier in McMurdo Sound on the opposite side of the continent, indicated widespread glacial activity not atypical of continental ice sheets. Some of the oldest glacial sediments, however, were deposited in the late Eocene, suggesting that the very first ice sheets, albeit small, formed nearly 40 mya. Thus, it appears that glacial activity was limited regionally to portions of East Antarctica until about the earliest Oligocene (about 35 mya).

E-52408

Liebezeit, G., **Amino sugars in Bransfield Strait and Weddell Sea sediments,** *Senckenbergiana maritima,* Mar. 5, 1993, 23(1/3), p.29-35, 21 refs.

Amino sugars have been analyzed in Weddell Sea and Bransfield Strait sediment cores. Glucosamine and galactosamine were found to be the prominent compounds with mannosamine occurring in one surface sample only at an extremely low concentration. Other amino sugars were present in trace quantities. Both amino sugars exhibited a strong covariability, with the Bransfield Strait samples having about three times higher concentrations than the Weddell Sea ones. In the former cores turbidite layers were lower in amino sugars than sediments derived from pelagic sedimentation. A comparison of water column particulate material and sediment trap with sediment data indicates that amino sugars are most likely derived from microheterotrophic biomass within the sediment. (Auth.)

E-52409

Eyles, N., **Earth's glacial record and its tectonic setting,** *Earth-science reviews,* Sep. 1993, 35(1/2), 248p., International Geological Correlation Program Contribution 260. Refs. p.211-248.

Glaciations have occurred episodically at different time intervals and for different durations in Earth's history. Ice covers have formed in a wide range of plate tectonic and structural settings but the bulk of Earth's glacial record can be shown to have been deposited and preserved in basins within extensional settings. The stratigraphic record of Archean glaciations is not extensive and may be the result of non-preservation. The oldest unambiguous glacial succession in Earth history appears to be the Early Proterozoic Gowganda Formation of the Huronian Supergroup in Ontario; the age of this event is not well-constrained but glaciation coincided with regional rifting just after 2300 Ma. Late Proterozoic glacially-influenced strata occur on all seven continents and fall into two tectonostratigraphic types. In the first category are thick successions of turbidites and mass flows deposited along active, compressional plate margins recording a protracted and complex phase of supercontinent assembly between 800 and 500 Ma. The second tectonostratigraphic category of Late Proterozoic glacial strata includes successions of glacially-influenced, mostly marine strata deposited along rifted, extensional plate margins. (Auth. mod.)

E-52410

Huber, B.T., Liu, C.J., Olsson, R.K., Berggren, W.A., **Comment on "The Cretaceous-Tertiary boundary transition in the Antarctic Ocean and its global implications", by G. Keller,** *Marine micropaleontology,* Dec. 1994, 24(2), p.91-99, 34 refs. For the paper under discussion, see 21E-48471.

Based on study of three ODP (Ocean Drilling Program) sites, Keller (1993) purportedly identified a high latitude center of origin for early Paleocene planktic foraminifera and presented evidence for a long-term environmental crisis "that began during the last 200,000 to 300,000 years of the Cretaceous and continued at least 300,000 years into the Tertiary" (p.1). While these are provocative statements that would be an important advancement in the knowledge of a critical stratigraphic interval, the stratigraphic resolution cited is untenable, given the significant biostratigraphic and preservation problems associated with each of these sites. Further, taxonomic errors in the Keller (1993) study lead to incorrect age assignments and result in erroneous biostratigraphic and biogeographic interpretations. It is therefore believed the evidence presented does not support the conclusions reached. These comments focus primarily on Site 738, which contains the most complete K/T boundary interval yet recovered from the deep sea. Those considered to be key inconsistencies are summarized.

E-52411

Keller, G., MacLeod, N., **Reply to comment on 'The Cretaceous-Tertiary boundary transition in the Antarctic Ocean and its global implications',** *Marine micropaleontology,* Dec. 1994, 24(2), p.101-118, 66 refs. For the paper under discussion, see 21E-48471.

The critique of Huber et al. (1994, this issue) follows two lines of argument. The first is that Keller (1993) does not confirm Huber's (1991) earlier study. The second is devoted to criticizing Keller (1993) for not following the revised taxonomy of Olsson et al. (1992), Liu and Olsson (1992) and Olsson and Liu (1993). Huber et al. (1994, this issue) do not mention the fact that none of these studies was published at the time the paper they criticize was written (during the fall of 1991). But even if these studies had been known, they would not have influenced the arguments presented by Keller (1993) since none of these publications provides convincing arguments in favor of their proposed taxonomic revisions (for a critique see MacLeod, 1993 in press). In addition, Huber et al. (1994, this issue) criticize Keller for not following the Berggren and Miller (1988) Paleogene biozonation. These issues are responded to. (Auth.)

E-52427

Cape Roberts Project International Steering Committee, **Antarctic climate and tectonic history: the Cape Roberts Project,** *Eos,* Jan. 4, 1994, 75(1), p.2-3.

Scientists and logistics experts from Germany, Italy, New Zealand, the United Kingdom and the United States met from Sep. 21 to 23, 1993, near Washington, D.C., to discuss management, logistics, and science objectives of a proposed international stratigraphic drilling project. The project plans to core 1500 m of strata beneath the western Ross Sea off Cape Roberts, where shipboard geophysical surveys indicate that dipping sedimentary strata occur close to the seafloor beneath a thin blanket of much younger sediments. These sediments include the oldest sedimentary sequences in the Ross Sea and are interpreted to be from 30- to more than 100 m.y. old. No rocks of this age are known to crop out in the Ross Sea-Transantarctic Mountains region or other parts of East Antarctica.

E-52428

Duane, A.M., **Preliminary palynological investigation of the Byers Group (Late Jurassic-Early Cretaceous), Livingston Island, Antarctic Peninsula,** *Review of palaeobotany and palynology,* Dec. 1994, 84(1/2), p.113-120, Refs. p.119-120.

Dinoflagellate cyst assemblages of the Byers Group have been correlated with palynostratigraphical zones established for the Mesozoic of Australia. The President Beaches Formation is believed to be latest Early Berriasian-Berriasian in age, based on its similarity to the *Kalyptea wisemaniae* and *Cassiculosphaeridia delicata* Interval Zones. The precise age assignment of the Chester Cone Formation is more problematic, as the dinoflagellate cyst assemblages present are significantly different to those previously known from the Southern Hemisphere. However, it is suggested that the upper part of the formation is probably latest Berriasian to earliest Valanginian in age. Palynological and macrofossil evidence date an important unconformity between the President Beaches and Chester Cone formations as latest Berriasian-early Valanginian. The palynological content of the Byers Group implies that the palaeoceanographic setting varied from dominantly marginal marine to occasionally more fully marine conditions. (Auth.)

E-52430

Kyle, P.R., ed, **Volcanological and environmental studies of Mount Erebus, Antarctica,** *American Geophysical Union. Antarctic research series,* 1994, Vol.66, 162p., Refs. passim. For individual papers see E-52435 through E-52442 and L-52431 through L-52434.

This volume consists of twelve papers reporting results of 20 years of studies carried out on Mount Erebus; they describe various aspects of the volcanology and environmental impact of the volcano. The subjects covered include remote sensing, seismology, estimates and characterization of gas and aerosol emissions, magma crystallization and evolution, deformation studies, and the chemical record left by the gas emissions in the snow surrounding the volcano.

E-52434

Rothery, D.A., Oppenheimer, C., **Monitoring Mount Erebus by satellite remote sensing,** *American Geophysical Union. Antarctic research series,* 1994, Vol.66, Volcanological and environmental studies of Mount Erebus, Antarctica. Edited by P.R. Kyle, p.51-56, Refs. p.55-56.

The harsh conditions at Mount Erebus make remote sensing an attractive means to help monitor its activity. Here the authors review previous attempts to determine conditions at the active vent of Erebus by satellite-based infrared techniques using data of both high and low spatial resolution. Either resolution can reveal the presence of hot material exposed at the surface. By using the high-resolution data, it is possible to estimate the sizes and temperatures of the hot areas. Uncertainties are considerable, but they will be less for future generations of satellite instruments. (Auth.)

E-52435

Otway, P.M., Blick, G.H., Scott, B.J., **Volcanic deformation monitoring on Mount Erebus: methods and results of geodetic surveys, 1980-1985,** *American Geophysical Union. Antarctic research series,* 1994, Vol.66, Volcanological and environmental studies of Mount Erebus, Antarctica. Edited by P.R. Kyle, p.57-68, 23 refs.

A program to monitor volcanic deformation about the active summit crater of Mount Erebus was conducted from Dec. 1980 to Dec. 1985. Precise triangulation, trilateration, and tilt-leveling surveys were made annually in conjunction with the International Mount Erebus Seismic Studies project. Observed volcanic deformation has been restricted to a relatively minor expansion across the 500-m wide crater totaling 50±20 mm. Most of this deformation was recorded in 1982 and 1984 coinciding with increased seismic and volcanic activity, respectively. The deformation is interpreted as minor inflation associated with the increased gas and heat flux beneath Main Crater. There was no evidence for substantial volume change in magma stored at shallow levels or a blockage in the conduit during the monitored period. The geodetic data also suggest a shallow rift system extending southwest from Main Crater through Side and Western craters. Short-term deformation detected during early Dec. 1984 could not be correlated with ongoing eruptive activity. (Auth. mod.)

E-52436

Kyle, P.R., Sybeldon, L.M., McIntosh, W.C., Meeker, K., Symonds, R., **Sulfur dioxide emission rates from Mount Erebus, Antarctica,** *American Geophysical Union. Antarctic research series,* 1994, Vol.66, Volcanological and environmental studies of Mount Erebus, Antarctica. Edited by P.R. Kyle, p.69-82, Refs. p.80-82.

Volcanic emission rates of SO_2 have been measured at Mount Erebus annually between 1983 and 1991 by correlation spectrometer (COSPEC V). Between 1988 and 1991, high-precision measurements became possible by automating the COSPEC operations and with the use of continuous video observations to determine vertical plume rise rates. In Dec. 1983, SO_2 emissions were 230 Mg/d, declining to 25 Mg/d in Dec. 1984 following a 3-month period of sustained strombolian eruptions which buried a persistent, convecting anorthoclase phonolite lava lake. Since 1985 there has been a general trend of increasing SO_2 emissions which correlates with the area of magma exposed in small magma pools in the crater. Annual SO_2 emission rates have ranged from a high of 84 Gg/yr in 1983 to a low of 6 Gg/yr in 1985. These rates are trivial in comparison with global volcanic SO_2 emissions but may be important on a local scale. (Auth.)

E-52437

Sheppard, D.S., Le Guern, F., Christenson, B.W., **Compositions and mass fluxes of the Mount Erebus volcanic plume,** *American Geophysical Union. Antarctic research series,* 1994, Vol.66, Volcanological and environmental studies of Mount Erebus, Antarctica. Edited by P.R. Kyle, p.83-96, Refs. p.95-96.

In Dec. 1989 and Jan. 1990, gas and aerosol samples were collected in the plume of Mount Erebus to evaluate its impact on the antarctic environment and to evaluate the processes and reactions occurring in the plume. Using an SF_6 injection technique, a flux of SO_2 of 2.4 Mg/d was determined, much lower than most other determinations. H_2S was detected at very low concentrations, whereas H_2SO_4 varied in concentration but at times exceeded SO_2. The presence of elevated levels of plume components in snow some distance from the crater indicates that processes removing material from the plume are significant. Elevated levels of CO_2 in soils and ice tower gases indicate that flank degassing does occur on the volcano. (Auth.)

E-52438

Chuan, R.L., **Dispersal of volcano-derived particles from Mount Erebus in the antarctic atmosphere,** *American Geophysical Union. Antarctic research series,* 1994, Vol.66, Volcanological and environmental studies of Mount Erebus, Antarctica. Edited by P.R. Kyle, p.97-102, 7 refs.

Emission rates of up to 20 megagrams per day of particles, smaller than about 50 µm, have been measured in the eruption plume from Mount Erebus. Being the only local source of volcanic aerosols, it is possible to trace their dispersal over long distances from the volcano. By matching the size distribution, particle morphology, and elemental composition of the aerosol in the ambient atmosphere to those measured directly in the plume, volcano-derived particles from Erebus have been traced as far away as the South Pole and to an altitude of 8 km. (Auth.)

E-52439

Palais, J.M., Mosher, B.W., Lowenthal, D., **Elemental tracers of volcanic emissions from Mount Erebus in antarctic snow samples,** *American Geophysical Union. Antarctic research series,* 1994, Vol.66, Volcanological and environmental studies of Mount Erebus, Antarctica. Edited by P.R. Kyle, p.103-113, Refs. p.111-113.

Mount Erebus was evaluated as a source of trace elements and other impurities for the antarctic environment. Snow samples were collected to determine whether a trace element signature characteristic of Erebus could be identified in antarctic snow samples. The snow was analyzed by instrumental neutron activation analysis for a suite of trace elements. The source of contaminants in the snow samples was determined using receptor-modeling estimates of source contributions. Most snow samples contained significant contributions from crustal sources and minor marine components. A signature characteristic of the volcanic gas plume of Erebus was found mainly in snow samples collected close to the volcano. (Auth.)

E-52441

Dunbar, N.W., Cashman, K.V., Dupré, R., **Crystallization processes of anorthoclase phenocrysts in the Mount Erebus magmatic system: evidence from crystal composition, crystal size distributions, and volatile contents of melt inclusions,** *American Geophysical Union. Antarctic research series,* 1994, Vol.66, Volcanological and environmental studies of Mount Erebus, Antarctica. Edited by P.R. Kyle, p.129-146, Refs. p.144-146.

Mount Erebus is a large, active, phonolitic volcano that contains an actively convecting and continuously degassing phonolite lava lake. Bombs emitted during eruptions contain strikingly large anorthoclase feldspar phenocrysts, which appear to be the product of a two-stage growth process. Initial crystal growth produces a spongy core containing abundant melt inclusions (MI), followed by deposition of fine laminae that form the crystal rims. Size distributions suggest that these crystals have low nucleation rates, but nucleate and grow continuously over time. Trace and major element systematics, combined with Normarski imaging, suggest that crystal cores are a result of rapid growth, whereas the rims are the result of slow growth coupled with repeated resorption episodes. The MI found in anorthoclase crystals are compositionally similar to matrix glass. The volatile contents of MI are low, suggesting that the crystals grew from degassed magma at depths of between 400 m and the surface. Degassing of the magma during ascent may trigger rapid, low-pressure crystallization. (Auth.)

E-52442

Caldwell, D.A., Kyle, P.R., **Mineralogy and geochemistry of ejecta erupted from Mount Erebus, Antarctica, between 1972 and 1986,** *American Geophysical Union. Antarctic research series,* 1994, Vol.66, Volcanological and environmental studies of Mount Erebus, Antarctica. Edited by P.R. Kyle, p.147-162, 20 refs.

Short-term variations in the magmatic composition of Mt. Erebus were examined by analyzing olivine, clinopyroxene, magnetite, anorthoclase, and glass separated from bombs erupted between 1972 and 1986. Olivine, clinopyroxene, and glass show uniform compositions. Individual anorthoclase megacrysts show erratic zoning indicative of their complex growth histories. Magnetite has a constant composition in bombs erupted from 1972 until 1978, but then it shows a steady decline in ulvöspinel content. A decrease in temperature of 10° to 15°C, at constant oxygen fugacity, can account for the change in magnetite composition. To account for the increased size and frequency of strombolian eruptions in late 1984, the authors propose a model in which a batch of new volatile-rich phonolite was injected into the magma chamber. This provided the volatiles which drove the eruptions, but the magma itself did not reach the lava lake until after 1986 but before 1988. (Auth.)

E-52449

Gal'chenko, V.F., **Sulfate reduction, methane production, and methane oxidation in various water bodies of Bunger Hills oasis of Antarctica,** *Microbiology,* Jan. 1995, 63(4), p.388-396, Translated from Mikrobiologiya 63(4):683-698, July-Aug. 1994. 36 refs.

Bacterial sulfate reduction, bacterial methane production, and bacterial methane oxidation were investigated in the bottom sediments and water column of the perennially ice-covered and ice-breaking water bodies of the Bunger Hills. The three studied biogeochemical processes showed their highest activities in saltwater lakes and Transcription Bay, with no correlation with ice-cover presence. Sulfate reduction rates were one to two orders of magnitude higher than the rates of the methane cycle processes. Sulfate-reducing bacteria were shown to be responsible for mineralization of up to 39% of organic carbon produced in the course of photo- and chemosynthesis. The newly formed methane is immediately oxidized by methanotrophic bacteria, no CH_4 being accumulated in the perennially ice-covered water bodies. (Auth. mod.)

E-52451

Goodge, J.W., Hansen, V.L., Peacock, S.M., Smith, B.K., Walker, N.W., **Kinematic evolution of the Miller Range shear zone, central Transantarctic Mountains, Antarctica, and implications for Neoproterozoic to Early Paleozoic tectonics of the east antarctic margin of Gondwana,** *Tectonics*, Dec. 1993, 12(6), p.1460-1478, Refs. p.1476-1478.

High-grade ductile tectonites of the Precambrian Nimrod Group in the central Transantarctic Mountains form the Miller Range shear zone (MRSZ). This zone has a minimum structural thickness of 12-15 km. Shear-sense indicators record consistent top-to-the-SE, or left-lateral, shear within the NW striking, moderately SW dipping zone. The scale, high total strains ($\gamma \geq 5$), fabric uniformity, and the widespread presence of asymmetric microstructures formed at high temperatures, all indicate that strain rates within the MRSZ were high and that it represents a major crustal structure. Orogen-parallel displacements within this zone during the latest Neoproterozoic to Early Cambrian were at a high angle to penecontemporaneous orogen-normal contraction in outboard supracrustal rocks, suggesting that the Neoproterozoic to early Paleozoic plate margin of Antarctica was characterized by left-oblique convergence in which strain within the orogen was partitioned into deep-level strike slip and shallow-level contraction. (Auth. mod.)

E-52461

Powell, C.M., Li, Z.X., **Reconstruction of the Panthalassan margin of Gondwanaland,** *Geological Society of America. Memoir,* 1994, No.184, Permian-Triassic Pangean basins and foldbelts along the Panthalassan margin of Gondwanaland, edited by J.J. Veevers and C.M. Powell, p.5-9, 48 refs.

DLC QE674.P465 1994

Gondwanaland was reconstructed by first forming East Gondwanaland (India, Antarctica and Australia) and then closing East Gondwanaland to Africa with Madagascar in a tight northern fit against Somalia. The poles of rotation to form Gondwanaland follow those established by earlier investigators. Paleolatitudes found from the Gondwanan apparent polar-wander path documented previously show that South America and southern Africa were in high latitudes in the Devonian and Early Carboniferous, while Australia was in low latitudes, and that during the Late Carboniferous to the end of the Permian, Australia and adjacent Antarctica were in high latitudes while southern South America and southern Africa were in middle-to-low latitudes. The movement of the paleopole along the Panthalassan margin toward the Antarctic Peninsula during the Triassic to Early Jurassic placed most of the Panthalassan margin in middle to high latitudes during the early Mesozoic. (Auth.)

E-52462

Collinson, J.W., et al, **Permian-Triassic Transantarctic basin,** *Geological Society of America. Memoir,* 1994, No.184, Permian-Triassic Pangean basins and foldbelts along the Panthalassan margin of Gondwanaland, edited by J.J. Veevers and C.M. Powell, p.173-222, Refs. p.215-222.

DLC QE674.P465 1994

The Permian-Triassic Transantarctic basin, which occupied the Panthalassan margin of the East Antarctic craton, including the present Transantarctic and Ellsworth Mountains, evolved above a mid-Paleozoic passive continental margin basement through four Permian/Triassic/Jurassic stages. Earlier, a Devonian wedge of coastal-to-shallow marine quartzose sandstone developed on the eroded roots of the Late Cambrian-Early Ordovician Ross orogen. A lacuna in East Antarctica during the Carboniferous was followed by the inception of Gondwanan deposition in a wide Carboniferous/Permian extensional basin. Volcanic detritus at the base of the late Early Permian post-glacial marine(?) shale and sandstone sequence in the Ellsworth Mountains is the first sign of a volcanic arc and subduction along the Panthalassan margin. A similar but much thinner non-volcaniclastic sequence accumulated in the Transantarctic Mountains. (Auth. mod.)

E-52463

Veevers, J.J., Powell, C.M., Collinson, J.W., López-Gamundí, O.R., **Synthesis,** *Geological Society of America. Memoir,* 1994, No.184, Permian-Triassic Pangean basins and foldbelts along the Panthalassan margin of Gondwanaland, edited by J.J. Veevers and C.M. Powell, p.331-353, Refs. p.351-353.

DLC QE674.P465 1994

The Gondwanan basins and foldbelts developed on a rock basement in Antarctica and southern Africa and on a basement of Devonian foldbelts in southern South America and eastern Australia. At the other end of the Panthalassan margin, a new magmatic arc and yoked foreland basin arose in southern South America, and by 275 Ma had propagated 4,000 km to a point opposite Africa and the Ellsworth Mountains. This (Sakmarian) time saw an ephemeral postglacial marine transgression that flooded much of eastern and southern Australia, the south Atlantic margins of southern Africa and South America, and possibly the Transantarctic basin. From 258 Ma to the 250 Ma end of the Permian, the foreland basin in Antarctica and Australia subsided rapidly beneath the load of the overthrusting magmatic orogen to accumulate a piedmont of thick tuffaceous coal measures. Both coal and tuff disappeared in Antarctica and Australia at the Permian-Triassic boundary (250 Ma) and were succeeded by barren measures with redbeds. (Auth. mod.)

E-52470

Friedmann, I., **Permafrost as microbial habitat,** Viable microorganisms in permafrost. Edited by D. Gilichinskiĭ, Pushchino, Pushchino Scientific Center, Institute of Soil Science and Photosynthesis, RAN, 1994, p.21-26, 19 refs.

An extremely long generation time, which slows down evolutionary processes, is the principal factor in the apparent absence of successful adaptations in cold terrestrial (permafrost and antarctic cryptoendolithic) environments. In both environments, the level of metabolic activity is low to very low. The net ecosystem productivity is so low that, as shown in the case of the antarctic cryptoendolithic community, it is measurable only on geological time scales. The ecology of permafrost and of antarctic cryptoendolithic communities, besides certain remarkable parallel features, show further fundamental differences. (Auth. mod.)

E-52474

Nichols, G.T., **Role of mylonites in the uplift of an oblique lower crustal section, East Antarctica,** *Journal of metamorphic geology,* Mar. 1995, 13(2), p.223-238, Refs. p.237-238.

Three generations of mylonites discovered in the northern Prince Charles Mountains (nPCM) are associated with episodes of crustal thickening and thinning. First-generation mylonites (MY1) are shallow thrusts which pre-date both folding and peak metamorphic conditions, and formed during early crustal thickening. Second-generation mylonites (MY2) are significant subvertical normal faults that formed at conditions of *c.* 5 kbar and 700°C, and throughout the nPCM consistently display NW-block uplift. It is argued that MY2 uplift was rapid in the northwest, produced exhumation of approximately 6-7 km, and caused re-equilibration of most nPCM assemblages at lower pressures. Features of this terrane may be reconciled with a tectonic model involving simultaneous crustal thickening and lithospheric thinning; MY2 uplift may reflect isostatically induced uplift. In contrast, the adjacent east Lambert Glacier Region (eLGR) was unaffected by MY2 uplift and remained at lower crustal levels. (Auth. mod.)

E-52477

Zhao, Y., et al, **Early Paleozoic (Pan African) thermal event of the Larsemann Hills and its neighbours, Prydz Bay, East Antarctica,** *Science in China B,* Jan. 1995, 38(1), p.74-84, 27 refs.

The early Paleozoic (Pan African) thermal event of the Larsemann Hills and its adjacent areas is discussed based upon the isotope ages obtained. An Sm-Nd internal isochron for a representative mafic granulite yields an age of 540±75 Ma. Another Sm-Nd internal isochron, which is made up of the assemblage of the peak metamorphism and its whole rock as well, gives an age of 497±7 Ma. The isotopic chronological data of single zircon stepwise evaporation dating and ^{40}Ar-^{39}Ar analysis provide further evidence for the early Paleozoic event of high-grade metamorphism in the region. The data from the field geological investigation in the Larsemann Hills also show that there is both strong regional partial melting and low-pressure granulite-facies metamorphism in the region. (Auth. mod.)

E-52523

Poscher, G., **Permo-Carboniferous glacial and periglacial sedimentation in the Kottas Mountains of Heimefrontfjella, Dronning Maud Land, Antarctica** [Permokarbone glaziale und periglaziale Sedimentation in den Kottas-Bergen der Heimefrontfjella, Dronning Maud Land (Antarktis)], *Zentralblatt für Geologie und Paläontologie. Teil I,* 1992 (Pub. 1994), Heft 11/12, International Association of Sedimentologists (IAS), 13th Regional Meeting, Jena, 1992, Proceedings. Edited by H. Lützner, p.1373-1386, In German with English summary. 36 refs.

For the Heimefront Range terrestrial glaciation has been confirmed. On the basis of palynologic analyses the minimum age of the Heimefront Range diamictites can be narrowed down to the period between the uppermost Carboniferous and the oldest Permian. Distribution of heavy minerals within the diamictite beds is characterized by glacial-abrasive garnet anomalies. Signs of weathering reflect the trend towards increasing chemical weathering in the clastic series situated above the diamictites and thus also render probable a glacial genesis for the diamictite itself. The assumption of glacial to periglacial climatic conditions in the strata overlying the diamictites is further substantiated by oxygen isotope composition and by a wide range of sedimentary structures. Finds of phytoclasts indicate a cool and arid climate and are supplemented by correlating results obtained in palynologic analyses. The direction of ice flow and the flow indications of the overlying sediments coincide and generally point to a palaeorelief varying between northwest and north. (Auth. mod.)

E-52526

Balushkin, A.V., ***Proeleginops grandeastmanorum* gen. et sp. nov. (Perciformes, Notothenioidei, Eleginopsidae) from the Late Eocene of Seymour Island (Antarctica) is a fossil notothenioid, not a gadiform,** *Journal of ichthyology,* Mar. 1995, 34(8), p.10-23, Translated from Voprosy ikhtiologii, 34(3):298-307, 1994. 25 refs.

The neurocranium of a fossil teleost from the La Meseta (Late Eocene) formation of Seymour I. is reinvestigated. Based on comparative analysis of skull characters of Gadiformes and Notothenioidei (Perciformes), it is referred to the notothenioid family, Eleginopsidae, and not to the Gadiformes, as was done by Eastman and Grande (1991). Based on a new construction of the fossil neurocranium, a new genus and species, *Proeleginops grandeastmanorum* gen. et sp. nov., is described. This species is the first fossil representative of the recent endemic ichthyofauna of Antarctica. Aspects of the evolution and historical development of the Eleginopsidae are discussed. (Auth.)

E-52534

Carson, C.J., Dirks, P.H.G.M., Hand, M., Sims, J.P., Wilson, C.J.L., **Compressional and extensional tectonics in low-medium pressure granulites from the Larsemann Hills, East Antarctica,** *Geological magazine,* Mar. 1995, 132(2), p.151-170, 42 refs.

Meta-sediments in the Larsemann Hills that preserve a coherent stratigraphy form a cover sequence deposited upon basement of mafic-felsic granulite. Their outcrop pattern defines a 10 km wide east-west trending synclinal trough structure in which basement-cover contacts differ in the north and the south, suggesting tectonic interleaving during a prograde D_1 thickening event. Subsequent conditions reached low-medium pressure granulite grade, and structures can be divided into two groups, D_2 and D_3, each defined by a unique lineation direction and shear sense. D_2 structures, which are associated with the dominant gneissic foliation in much of the Larsemann Hills, contain a moderately east-plunging lineating indicative of west-directed thrusting. D_2 comprises a colinear fold sequence that evolved from early intrafolial folds to late upright folds. D_3 structures are associated with a high-strain zone to the south of the Larsemann Hills, where S_3 is the dominant gneissic layering and fold sequences resemble D_2 folding. (Auth. mod.)

E-52536

Gersonde, R., ed, **Expedition ANTARKTIS-XI/2 of RV *Polarstern* in 1993/94** [Die Expedition ANTARKTIS-XI/2 mit FS *Polarstern* 1993/94], *Berichte zur Polarforschung,* 1995, No.163, 133p., In German and English with an extended English summary. Refs. p.92-95.

In spite of several equipment malfunctions which required short notice program and route reorganizations, the expedition collected much useful marine geologic survey data during four transects of the ACC. Surface and core samples of sediments filled gaps in the network of stations near the ACC area. As a core sediment dating tool, digitally recorded Parasound signals were correlated to identify events and fossils associated with the cores retrieved. Organisms living in the water column were sampled for distribution patterns based on nutrients, temperature, salinity, and isotopic composition. Chemical exchanges were studied at the atmosphere/water boundary and in the atmosphere, and hydrographic measurements based on CTD and XBT deployments and sea water sampling were made. Plankton were studied as to feeding, reproduction, and responses to solar ultraviolet radiation.

E-52591

Kelly, S.R.A., **New trigonioid bivalves from the Albian (Early Cretaceous) of Alexander Island, Antarctic Peninsula: systematics, paleoecology, and austral Cretaceous paleobiogeography,** *Journal of paleontology,* Mar. 1995, 69(2), p.264-279, Refs. p.277-279.

Newly discovered trigonioid bivalves are systematically described from the Late Albian of the Fossil Bluff Group of Alexander I. The fauna includes *Nototrigonia (Nototrigonia) ponticula* Skwarko, *N. (Callitrigonia) offsetensis* n.sp., *Eselaevitrigonia macdonaldi* n.sp., *Pterotrigonia (Pisotrigonia) capricornia* (Skwarko), and *Pacitrigonia praenuntians* n.sp. It represents the first Albian trigonioid fauna described from the Antarctic. It is also the first published record of the Nototrigoniinae (excluding *Pacitrigonia)* outside Australasia. Paleoecologically, this fauna represents the shallowest and highest energy molluscan assemblage from the Fossil Bluff Group and occurs near the base of a significant transgressive unit, the Mars Glacier Member of the Neptune Glacier Formation. The paleogeography of austral Cretaceous trigonioids is reviewed. Endemic centers are identified in India-East Africa, southern South America, and Australasia. Only one trigonioid genus, *Pacitrigonia,* had its origin in the Antarctic. (Auth. mod.)

E-52592

Maldonado, A., Larter, R.D., Aldaya, F., **Forearc tectonic evolution of the South Shetland Margin, Antarctic Peninsula,** *Tectonics,* Dec. 1994, 13(6), p.1345-1370, Refs. p.1368-1370.

The main provinces of the South Shetland margin, characterized on the basis of multichannel seismic, long-range side scan sonar and swath bathymetry data, include from northwest to southeast: the oceanic crust of the former Phoenix Plate, flexed down toward the margin and affected by normal faulting in the upper crust; a narrow trench, with a horizontally layered sediment fill which onlaps the thin sedimentary cover on the oceanic crust and shows incipient deformation near its landward edge; an accretionary prism with a complex internal structure, the toe of which is overthrust above the youngest trench deposits; a midslope forearc basin, with an asymmetric synformal structure; and the continental shelf, which includes two distinct tectonic provinces. Calculations of the late Cenozoic convergence history at the trench indicate a rapid decrease in convergence rate after 6.7 Ma from about 60 mm/yr, resulting from the slowing and eventual cessation of spreading on the Antarctic-Phoenix ridge. (Auth. mod.)

E-52617

Maurette, M., Brack, A., Kurat, G., Perreau, M., Engrand, C., **Were micrometeorites a source of prebiotic molecules on the early earth,** *Advances in space research,* Mar. 1995, 15(3), Life Sciences and Space Research XXV (4): Planetary Biology and Origins of Life. Proceedings of the Topical Meeting of the COSPAR Interdisciplinary Scientific Commission F (Meeting F3) of the COSPAR Twenty-ninth Plenary Meeting held in Washington, DC, USA, 28 August-5 September, 1992, p.(3)113-

(3)126, 34 refs.

Interplanetary dust particles of sizes ≈10 μm collected in the stratosphere (IDPs), as well as much larger "giant" micrometeorites retrieved from antarctic ice melt water (AMMs), are mostly composed of unequilibrated assemblages of minerals, thus being related to primitive unequilibrated meteorites. Two independent evaluations of the mass flux of micrometeorites measuring ≈50 μm to ≈200 μm, recovered from either the Greenland or the antarctic ice sheets, have been reported (≈20,000 tons/a). Micrometeorites represent about 99.5% of the extraterrestrial material falling on the Earth's surface each year, and are the major contributors of extraterrestrial C-rich matter accreting to the Earth today. They contain not only a variety of C-rich matter, such as a new "dirty" magnetite phase enriched in P, S, and minor elements, but also a diversity of potential catalysis such as hydrous silicates, oxides, sulfides and metal grains of Fe/Ni composition. (Auth. mod.)

E-52645

Franceschini, J., **Preservation of total organic carbon in sediments from the Ross Sea, Antarctica,** Clinton, Hamilton College, 1995, 98p., B.A. thesis. Refs. p.92-98.

Twelve sediment cores from the Ross Sea are analyzed to test the hypothesis of deglaciation of the West Antarctic Ice Sheet, its timing, and to search for possible causes of the glacial retreat. The methodology of this investigation includes total organic carbon, magnetic susceptibility, radiocarbon dating, and gravel frequency. The data demonstrate that the West Antarctic Ice Sheet grounded on the continental shelf during the last glacial maximum approximately 17,000 years ago. The cores penetrated a diatomaceous mud resting on a sharp contact with glacial marine sediments, indicating that the change from subglacial sedimentation to hemipelagic sedimentation occurred rapidly. Total organic carbon data demonstrate the retreat of the ice sheet, along with a period of elevated carbon percentages in the sediment which could possibly represent the Hypsithermal. The data show that recession of the ice shelf began about 19,000 years ago. Mechanisms for retreat include rapid and episodic rise in sea level and global climatic fluctuation. (Auth.)

E-52646

Hilfinger, M., **Chronology of the Late Pleistocene-Holocene deglaciation in the Ross Sea,** Clinton, Hamilton College, 1995, 59p., B.A. thesis. Refs. p.56-59.

A study of sediment cores from the Ross Sea can provide clues to the most recent deglaciation of the Ross Sea. This project examined 9 sediment cores and analyzed 43 AMS radiocarbon ages, total organic carbon, magnetic susceptibility, and grain frequency to determine the chronology of the deglaciation. Surface ages ranging from 2,575±55 yrs BP to 4,617±101 yrs BP indicate reworking has occurred in the surface sediments, while downcore ages increased with depth. Cores consist of diamictons with high MS values and low TOC values, overlain by diatomaceous muds with typically low MS values and high TOC values. The diatomaceous muds (>.5%) represent open marine origin. Contacts between these facies appear to represent transitional units indicating the movement of the grounding line. One datable transition between subglacial to sub-ice shelf environments is identified. Results indicate that ice sheet recession in the central Ross Sea began around 19,000 yrs BP. (Auth. mod.)

E-52648

Stump, E., **Ross orogen of the Transantarctic Mountains,** New York, Cambridge University Press, 1995, 284p., Refs. p.251-276.

DLC QE621.5.A6S78

The Ross orogen of the Transantarctic Mountains is the part of the orogenic system that formed at the Pacific continental margin of present-day Antarctica. According to one hypothesis, this continental margin was created by the rifting and subsequent drift of Laurentia from Gondwanaland. This book provides a detailed synthesis of the history of the Ross orogen, which commenced in the Neoproterozoic with passive margin sedimentation and progressed through a series of tectonic events that culminated in the Ross orogeny approximately 500 mya. It incorporates classical studies with discussions of the most recent and controversial research from the international community. The book also includes a comprehensive bibliography and a historical chronology of all expeditions that have worked on the Ross orogen, from the first sightings by Ross in 1840 to the present.

E-52662

Balks, M.R., Campbell, D.I., Campbell, I.B., Claridge, G.G.C., **Interim results of 1993/94 soil climate, active layer and permafrost investigations at Scott Base, Vanda and Beacon Heights, Antarctica,** *Waikato. University. Antarctic Research Unit. Special report,* Jan. 1995, No.1, 61p. + 64p. in Appendix, Refs. p.59-61.

Investigations of water characteristics in the active layer and permafrost of soils at Scott Base, Marble Point, Lake Vanda and Beacon Heights were undertaken during the 1993-94 antarctic summer as part of a program to assess the impact of humans on terrestrial ecosystems. The physical impact on soils from foot traffic disturbance was also assessed. At Scott Base, an experiment was established to measure the rate at which water is lost from the permafrost following the removal of the active layer and to relate water content changes to site microclimate and weather. Soil water content in soils in a disturbed area are compared with that in an adjacent undisturbed area. Initial results of measurements made using a neutron probe showed that, following removal of the active layer, the previously frozen soil warmed rapidly, melting the ice within the soil. Because of the low water contents in these soils, physical human disturbances are much less likely to impact on soil hydrological properties than in the coastal regions. Soil profile descriptions are appended in an additional 64 pages. (Auth. mod.)

E-52669

Gaździcka, E., Gaździcki, A., **Recycled Upper Cretaceous calcareous nannoplankton from the *Pecten* Conglomerate of Cockburn Island, Antarctic Peninsula,** *Polish Polar Research,* 1994, 15(1-2), p.3-13, With Polish summary. Refs. p.10-12.

Upper Cretaceous calcareous nannoplankton recycled into the Pliocene *Pecten* Conglomerate of Cockburn I. provide a paleontological record of Upper Cretaceous sedimentary sequences in the James Ross Basin. The calcareous nannofossil assemblage comprises nearly 40 taxa and is dominated by Campanian-Maestrichtian species. The investigated assemblage shares some features with the southern high-latitude contemporaneous calcareous nannofossil assemblages from outcrops on adjacent Seymour I. and many with deep-sea drilling sites in the circum-Antarctic region. (Auth.)

E-52681

Miono, S., Nakanishi, A., **Study of terrestrial ages of the antarctic meteorites with thermoluminescence,** *Il nuovo cimento,* Mar./Apr. 1993, 16C(2), p.195-202, 8 refs.

The terrestrial ages of antarctic meteorites were estimated from the thermoluminescence (TL) intensity of the fusion crust. It was found that there is a good correlation between the TL intensities and terrestrial ages which were previously measured by cosmogenic-radionuclide abundance. It was also observed that the LT/HT value gives false terrestrial ages. The basis for establishing the TL dating techniques regarding the terrestrial ages of antarctic meteorites is presented. (Auth.)

E-52691

Evans, K.R., Rowell, A.J., Rees, M.N., **Sea-level changes and stratigraphy of the Nelson Limestone (Middle Cambrian), Neptune Range, Antarctica,** *Journal of sedimentary research,* Feb. 1995, 65(1), p.32-43, 41 refs.

Basal beds of the Nelson Limestone formation constitute a nonmarine terrigenous valley-fill succession. Thickness of these strata varies from 0.1 to 72 m, suggesting that significant topographic relief existed below the sub-Nelson unconformity. In the Nelson Limestone, smaller fluctuations of relative sea level are indicated by three sequences, each about 100 m thick. The lower sequence is bounded below by the sub-Nelson unconformity and includes the valley-fill succession, transgressive sandstone, and highstand carbonate deposits. The top of a subaerially exposed interval of carbonates in one section is interpreted as a sequence boundary with correlative conformity in the deeper-water areas. The subaerially exposed interval is roughly correlative with a succession of five or more slump deposits 1-2 m thick in another section. Subaerial exposure at nearly the same stratigraphic level as the slumps marked a fundamental shift in depositional style. (Auth. mod.)

E-52701

Wahr, J., Han, D.Z., Trupin, A., **Predictions of vertical uplift caused by changing polar ice volumes on a viscoelastic earth,** *Geophysical research letters,* Apr. 15, 1995, 22(8), p.977-980, 12 refs.

Present-day changes in ice could cause vertical displacement rates of several mm/yr around Antarctica and up to 10-15 mm/yr around Greenland. Horizontal displacement rates are likely to be about $\frac{1}{3}$ the vertical rates. The viscoelastic response of the earth to past changes in ice could cause uplift rates that are several times larger. By measuring both gravity and vertical displacements, it is possible to remove the viscoelastic effects, so that the observations can be used to constrain present-day thickness changes. (Auth.)

E-52702

Spezie, G., et al, **Water masses characteristics, sediment dispersal and seismic stratigraphy in the continental margin of the Ross Sea (Antarctica),** *Annali della Facoltá di Scienze Nautiche,* 1993, Vol.60, var. p., 32 refs.

Morphological and geological characteristics of the Ross Sea are described, including the lithospheric structure and sedimentary sequences, hydrology, and suspended sediment dispersal. The study was carried out during the Italian Antarctic Expedition of 1990-1991; 30 hydrologic stations were deployed on the Ross Sea continental shelf in correspondence with the northern slope. Results are discussed and presented in tables and figures. The hydrological structures which characterize the shelf and slope waters are defined. It is concluded that the recent tectonic activities of the western Ross Sea are not completely dependent on the process generating the big Ross Sea rift, but are a consequence of a Neogene-Pleistocene phenomenology in conjunction with the Balleny Fracture Zone activity.

E-52707

Doubleday, P.A., Tranter, T.H., **Deformation mechanism paths for oceanic rocks during subduction and accretion: the Mezozoic forearc of Alexander Island, Antarctica,** *Journal of the Geological Society of London,* May 1994, 151(3), p.543-554, 66 refs.

The LeMay Group of Alexander I. contains slivers of ocean floor and ocean island material, accreted under a range of conditions and depths. The slivers consist of a bedded basalt-volcaniclastite-chert rock association, overlain by trench-fill sedimentary rocks. The oceanic lithologies, initially deformed by cataclasis, combined with particulate flow in the volcaniclastic rocks. At shallow levels the clastic trench-fill sedimentary rocks deformed by independent particulate flow, which changed to cataclastic flow at depth. Crystal plasticity was the dominant deformation mechanism in the clastic sedimentary rocks, whilst cataclasis continued in the lavas. Deformation was synchronous with metamorphism up to transitional greenschist-blueschist facies. The deformation mechanism paths indicate that there is a crystal plastic deformation field at deep levels in the subduction zone, and that the base of the pressure solution field is concordant with the decollement. (Auth. mod.)

E-52708

Antarctic Meteorite Working Group, **Antarctic meteorite newsletter, Vol.18, No.1, Feb. 1995,** Houston, Texas, NASA Johnson Space Center, 1995, 20p.

This newsletter presents classifications of 396 meteorites from the 1993 ANSMET collection. The new meteorites include 2 mesosiderites, 1 lodranite, 2 ureilites, 1 CV3 carbonaceous chondrite, 2 enstatite chondrites, and 3 unequilibrated ordinary chondrites. Pages 5-16 contain preliminary descriptions and classifications of meteorites that were completed since publication of issue 17(3) (Aug. 1994). Specimens of special petrologic type (carbonaceous chondrite, unequilibrated ordinary chondrite, achondrite, etc.) are represented by separate descriptions unless they are paired with previously described meteorites.

E-52748

Foster, C.B., Balme, B.E., Helby, R., **First record of Tethyan palynomorphs from the Late Triassic of East Antarctica,** *AGSO journal of Australian geology and geophysics,* 1994, 15(2), p.239-246, 38 refs.

A well-preserved Late Triassic palynoflora from the upper Flagstone Bench Formation, Prince Charles Mountains contains taxa that are also widely distributed in coeval Tethyan Laurasian assemblages. The assemblage is assigned to the Australian *Minutosaccus crenulatus* Zone, and considered to be of Norian age. Gondwanan palynofloras containing these Laurasian elements are assigned to the Onslow Microflora, which is represented by Middle and Late Triassic palynomorph assemblages from Madagascar, western and northern Australia, East Africa, and Peninsular India. Occurrences of the Onslow Microflora appear to be confined to sediments deposited in palaeolatitudes between about 40-30°S. Availability of migration pathways along Tethyan coastal plains, exposed during periods of sealevel regression, was an important factor controlling the rapid dispersal of certain Triassic plants. (Auth. mod.)

E-52750

Matsumoto, G.I., Matsumoto, E., Sasaki, K., Watanuki, K., **Geochemical features of organic matter in sediment cores from Lützow-Holm Bay, Antarctica,** Symposium on organic matter: productivity, accumulation, and preservation in recent and ancient sediments, Nov. 1988, edited by J.K. Whalen and J.W. Farrington, New York, Columbia University Press, 1992, p.142-175, 91 refs.

DLC QE516.5.O7237 1992

Organic geochemical and geochronological studies of two marine sediment core samples near Langhovde Glacier (Core B,) and about 40 km to the east of the Core B sample, Core A in Lützow-Holm Bay, have been conducted to understand sedimentary sequences and the distribution, sources, preservation, and destruction of organic matter in an antarctic setting. The sediments are composed mainly of poorly sorted glacial clay; sedimentation rates for Core A varied from about 1.5 mm to about 4.5 mm in tiered depths from 0-50 cm. Vertical distributions of radioisotopic data and organic compounds suggest considerable reworking by iceberg movements. The abundance of iso- and anteiso-alkanoic acids in the Core A sample suggest that bacterial contributions to this sample are considerably greater than those to the Core B sample. The sources of organic matter are mainly phytoplankton and zooplankton, including ice algae, and microorganisms, with small amounts of eroded recycled sediments and the waxes of vascular plants.

E-52751

Simoneit, B.R.T., **Natural hydrous pyrolysis: petroleum generation in submarine hydrothermal systems,** Symposium on organic matter: productivity, accumulation, and preservation in recent and ancient sediments, Nov. 1988, edited by J.K. Whalen and J.W. Farrington, New York, Columbia University Press, 1992, p.368-402 (pertinent p.380-381 and p.398-402), Refs. p.398-402.

DLC QE516.5.O7237 1992

The conversion of organic matter to petroleum products by hydrothermal activity is a geologically rapid process, occurring in nature in many types of submarine environments. Geologically immature organic matter of marine sediments is being altered to petroleum by this process, which is analogous to laboratory hydrous pyrolysis. This activity has been studied in Guaymas Basin (Gulf of California), Escanaba Trough and Middle Valley (NE Pacific), Bransfield Strait (Antarctica), and Atlantis II Deep (Red Sea). Petroleum-like products are formed by the same process from contemporary organic detritus and/or viable microorganisms when they become entrained by turbulent mixing into the discharging vent waters, resulting in an instantaneous hydrous pyrolysis. Preliminary data from laboratory hydrous pyrolysis studies indicate that some of the organic matter interconversions observed in nature can be duplicated and thereby studied in greater detail. Hydrous pyrolysis is a natural process in hydrothermal vent systems generating petroleum, and the associated fluids are efficient solvents for primary and secondary migration of that petroleum.

E-52752

Haynes, V.M., **Alpine valley heads on the Antarctic Peninsula,** *Boreas,* Mar. 1995, 24(1), p.81-94, 85 refs.

Numerous nunataks in the Antarctic Peninsula are highly dissected by alpine valley heads (corries, cirque-headed valleys, etc.). It is believed that these were cut by wet-based mountain glaciation before and during the buildup of the ice-sheet, though the smallest ones may have formed later when the ice-sheet was insufficiently thick to submerge them. Dimensions of the features suggest that the main alpine glaciation was in the Miocene. Morphometric analysis of 1663 alpine valley heads has been based on satellite imagery, concentrating on regional variations in frequency, size and orientation. Length of alpine glaciation is believed to be an important control of size. Orientation is believed to have been influenced by palaeoclimate as well as topography. During early and more marginal glaciations, poleward and lee-side sites were occupied by corrie glaciers, with more windward sites being added as glaciation intensified, followed by northerly orientations under more recent polar conditions. (Auth. mod.)

E-52767

Molin, G., Domeneghetti, M.C., Salviulo, G., Stimpfl, M., Tribaudino, M., **Antarctic FRO90011 lodranite: cooling history from pyroxene crystal chemistry and microstructure,** *Earth and planetary science letters,* Dec. 1994, 128(3-4), p.479-487, 31 refs.

The antarctic FRO90011 lodranite shows an achondritic coarse granoblastic texture with an approximately chondritic composition. The crystal chemistry of Pbca and C2/c pyroxene single crystals and the TEM texture of Pbca pyroxene were investigated to reconstruct the evolutionary history of the meteorite parent body. The structural behavior of orthopyroxene ($En_{85}Fs_{12.4}Wo_{2.6}$) is well constrained in the En-Fs trend. Orthopyroxene FE^{2+}-Mg ordering in the M1 and M2 sites yields a closure temperature (T_c) of 570±20°C and a cooling rate of 10°C/day near the T_c. Clinopyroxene Fe^{2+}-Mg ordering in the M1 and M2 sites yields a T_c of 513±50°C, which is compatible with the cooling rate derived from the orthopyroxene crystals. TEM-EDS analysis did not reveal significant chemical differences between lamella-rich and lamella-free zones. The above data are interpreted as being due to fast cooling resulting from radiative heat loss of small fragments ejected from a parent body, which were subsequently reassembled into a larger body. (Auth.)

E-52772

Miller, M.F., Collinson, J.W., **Trace fossils from Permian and Triassic sandy braided stream deposits, central Transantarctic Mountains,** *Palaios,* Dec. 1994, 9(6), p.605-610, 25 refs.

Sandy braided streams delivering sediment to the foreland basin along the paleo-Pacific margin of Gondwana during the Permian and Triassic were inhabited by an active infaunal animal, probably an arthropod. This animal moved horizontally and vertically within the sediment, producing four types of traces, including vertical shafts, horizontal endostratal trails, bilobed endostratal trails and chevron traces. A common producer is indicated by congruence of size distributions of the traces, and by the fact that single traces change from one type to another. Unable to survive high flow conditions, the animal colonized channel bar sands during slack water and moved in unlined burrows throughout the upper 20 cm of sediment. Its opportunism and behavioral plasticity may have been keys to its survival and success in sandy fluvial habitats throughout the Late Permian and Triassic. (Auth.)

E-52788

Cione, A.L., Azpelicueta, M.M., Bellwood, D.R., **Oplegnathid fish from the Eocene of Antarctica,** *Paleontology,* Mar. 1995, 37(4), p.931-940, Refs. p.938-940.

The oldest remains of the teleost family Oplegnathidae are reported from Antarctica. Fragmentary beaks with the typical coalesced teeth have been discovered. The antarctic material presents characteristic features of members of the extant Oplegnathidae: jaws lacking lateral canines, distinctly crenulate cutting margins, teeth with narrow cutting edges that show evidence of a bipartite structure; there are also large rounded molariform teeth on the medial face of the jaws. This record confirms that the seawater was temperate when rocks of Telms 4-5 (middle Eocene) of La Meseta Formation were deposited. Oplegnathids had at that time a wider geographical distribution than today. (Auth.)

E-52795

Rocholl, A., Stein, M., Molzahn, M., Hart, S.R., Wörner, G., **Geochemical evolution of rift magmas by progressive tapping of a stratified mantle source beneath the Ross Sea Rift, northern Victoria Land, Antarctica,** *Earth and planetary science letters,* Apr. 1995, 131(3-4), p.207-224, 50 refs.

This study documents the Nd, Sr, and Pb isotopic compositions of Cenozoic near-primary to differentiated volcanic rocks of the McMurdo Volcanic Group from several regions along the western margin of the RSR (Ross Sea Rift) in Northern Victoria Land. The samples represent different stages in the evolution of the rift, ranging in age between 15 Ma to the present and erupted in different tectonic environments. The major aims of the study are (1) to determine the isotopic compositions and types of the mantle sources involved in the petrogenesis of the near-primary basalts, (2) to establish possible relationships among isotopic signature, tectonic setting and rift evolution and (3) to deduce a model for the mantle structure beneath the RSR. (Auth. mod.)

E-52814

Martínez, G.A., Massone, H.E., **Geomorphological map of Half Moon I., South Shetland Is.** [Mapa geomorfológico de la isla Media Luna, islas Shetland del Sur, Antártida], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1994, No.434, 23p., In Spanish with English summary. 20 refs.

A geomorphological study was carried out at Half Moon I., which has been found extraordinarily rich in marine features above the present sea level. This allows one to infer its Quaternary evolution. Periglacial and glacial landforms, as structured soils and erratic blocks, were recognized. Marine landforms were divided into three categories: erosive, accumulative and reworked. The latter comprises materials primarily deposited by ice and later redistributed by coastal processes during summer. The results are shown in a map (scale 1:5000) with an explanatory text. (Auth. mod.)

E-52820

Bradshaw, M., **Permian nonmarine bivalves from the Ohio Range, Antarctica,** *Alcheringa,* 1984, 8(4), p.305-309, 16 refs.

DLC QE578.A1 A4

Compressed bivalve fossils collected from the Permian Mount Glossopteris Formation on Mount Glossopteris in the Ohio Range, Horlick Mountains, are identified and described as *Palaeanodonta fischeri* (Amalitsky). The bivalves are accompanied by fragmented plant material, mainly *Glossopteris,* and occur at roughly the same stratigraphic horizon as conchostracans on Mount Schopf 10 km to the south.

E-52822

Schüssler, U., Heinjes-Kunst, F., **Petrographical and geochronological investigations on a garnet-tourmaline pegmatite from Ringgold Knoll, Oates Coast, Antarctica** [Petrographische und geochronologische Untersuchungen an einem Granat-Turmalin-Pegmatit vom Ringgold Knoll, Oates Coast, Antarktis], *Chemie der Erde,* Nov. 1994, 54(4), p.297-318, With German summary. 44 refs.

The Ringgold Knoll pegmatite crosscuts high-grade Wilson gneisses of the Oates Coast, which forms the westernmost part of the Wilson Terrane at the Pacific end of the Cambro-Ordovician Ross orogenic belt in West Antarctica. This pegmatite mineral assemblage consists of K-feldspar, plagioclase, quartz, garnet, dark tourmaline, muscovite, apatite, monazite, zircon, blue Al-rich tourmaline and dumortierite in order of decreasing abundances. Major, minor and rare earth elements are reported for the greater part of the mineral assemblage. The time of pegmatite emplacement is constrained by Rb-Sr and Sm-Nd isochron ages. High initial $^{87}Sr/^{86}Sr$ and low ε Nd,t strongly support an origin of the magma from highly evolved crustal source rocks. K-Ar and ^{40}Ar-^{39}Ar model ages indicate that the pegmatite together with its wall rocks spent a prolonged period at elevated temperatures before final cooling below about 350°C. The muscovite dates may give an estimate for the time of exhumation of the Oates Coast crystalline basement along two major late Ross orogenic detachment zones within the Wilson Terrane. (Auth. mod.)

E-52823

Schubert, W., Will, T., **Granulite facies rocks of the Shackleton Range, Antarctica. Conditions of formation and preliminary petrogenetic implications** [Granulitfazielle Gesteine der Shackleton Range, Antarktis. Bildungsbedingungen und erste petrogenetische Folgerungen], *Chemie der Erde,* Nov. 1994, 54(4), p.355-371, With German summary. 65 refs.

Two types of granulites are recognized in the Shackleton Range. The enderbitic garnet granulites of the southern part (Read Mountains), characterized by an isobaric cooling path (IBC) are interpreted as products of deep crustal metamorphism during penetrative lithospheric-scale deformation. They seem to be deep crustal parts of the East Antarctic craton which are tectonically transported into higher crustal levels and reworked under amphibolite-facies conditions of 600-550°C/4-5 kbar during the middle Proterozoic Nimrod orogeny. However, the relic high-pressure granulites of the northern part (Mt. Provender area) yield a nearly isothermal decompression path (ITD) which could be extended to 660°C/6.2 kbar. This characterizes a probable collisional tectonic regime with crustal overthickening due to tectonic imbrication and thrusting on the stable East Antarctic Craton (Read Mts.) during the early Palaeozoic compressive Ross orogeny. (Auth.)

E-52838

Domack, E.W., Ishman, S.E., Stein, A.B., McClennen, C.E., Jull, A.J.T., **Late Holocene advance of the Müller Ice Shelf, Antarctic Peninsula: sedimentological, geochemical and palaeontological evidence,** *Antarctic science,* June 1995, 7(2), p.159-170, Refs. p.169-170.

Marine sediment cores were obtained from in front of the Müller Ice Shelf in the summer of 1990-91. Sedimentological and geochemical data from these cores document a warm period that preceded the advance of the Müller Ice Shelf into Lallemand Fjord. Advance of the ice shelf is indicated by a shift from assemblages dominated by calcareous benthic and planktonic forms to those dominated by agglutinated forms. A ^{14}C chronology for the cores indicates that the advance of the Müller Ice Shelf took place c. 400 years ago, coincident with glacier advances in other high southern latitude sites during the onset of the Little Ice Age. Ice core evidence, however, documents this period as one of warmer temperatures for the Antarctic Peninsula. It is suggested that the ice shelf advance was linked to the exclusion of circumpolar deep water from the fjord. (Auth. mod.)

E-52841

Smellie, J.L., Millar, I.L., **New K-Ar isotopic ages of schists from Nordenskjöld Coast, Antarctic Peninsula: oldest part of the Trinity Peninsula Group?,** *Antarctic science,* June 1995, 7(2), p.191-196, Refs. p.195-196.

K-Ar whole-rock dating of five samples of quartz-mica schist from the Nordenskjöld Coast provides the first unequivocal evidence of pre-Triassic (>249±7 Ma) deposition of a sequence regarded as part of the Trinity Peninsula Group (TPG). A maximum age range of latest Carboniferous (<c. 300 Ma)-Permian for deposition of the Nordenskjöld Coast sequence is indicated, and a polymetamorphic, polydeformational history for the TPG in northern Graham Land. However, the possibility exists that the rocks dated here from the Nordenskjöld Coast are part of a hitherto-unrecognized metamorphic basement unrelated to and older than the mainly Triassic TPG outcrops farther north. The new ages confirm the existence of a previously poorly-defined regional metamorphic event in the Antarctic Peninsula at about 245-250 mya. (Auth.)

E-52845

Wilson, T.J., **Cenozoic transtension along the Transantarctic Mountains-West Antarctic rift boundary, southern Victoria Land, Antarctica,** *Tectonics,* Apr. 1995, 14(2), p.531-545, Refs. p.544-545.

Brittle fault arrays mapped along the structural boundary between the Transantarctic Mountains and the West Antarctic rift system are oriented obliquely to the axis of the mountains and offshore rift basins. The north-to-northwest trending regional rift boundary is thus not controlled by continuous rift border faults. Instead, the rift margin trend must be imposed by inherited lithospheric weaknesses along the ancestral East Antarctic craton margin. Fault kinematic solutions indicate that a dextral transtensional regime characterized the rift boundary in the Cenozoic and that dominantly transcurrent motion occurred during the most recent faulting episode. The Transantarctic Mountains are considered to be a rift-flank uplift, yet no substantial isostatic uplift is expected in a transtensional setting, and the mechanism of large-magnitude Cenozoic uplift of the mountains remains problematical. (Auth. mod.)

E-52846

Wever, H.E., Storey, B.C., Leat, P.T., **Peraluminous granites in NE Palmer Land, Antarctic Peninsula: early Mesozoic crustal melting in a magmatic arc,** *Geological Society of London. Journal,* Jan. 1995, 152(Part 1), p.85-96, 52 refs.

A suite of Early Jurassic metaluminous to strongly peraluminous granitoids occupy a rear-arc position in Palmer Land with respect to a Mesozoic-Cenozoic magmatic arc. Fractional crystallization of a range of mafic to silicic magmas yielded feldspar megacrystic granites, orthogneisses and foliated granodiorites. Leucogranites are strongly peraluminous and have the highest $^{87}Sr/^{86}Sr$ initial ratios of 0.7205-0.7208, somewhat lower than those of older paragneiss. Isotopic and elemental data are used to model generation of leucogranite magma by partial melting of paragneiss, followed by mixing of basalt magma with the crustal melt to form parent magmas of the rest of the granitoids. The crustal partial melting was a result of heat convected by the mafic magma, intruded into an extensional back-arc basin setting contemporaneous with the initial stages of Gondwana break-up. The nature of the mantle source(s) of the enriched basalt is uncertain, but it is isotopically similar to approximately contemporaneous basalts associated with the Karoo mantle plume. (Auth.)

E-52861

Buggisch, W., Kleinschmidt, G., Höhndorf, A., Pohl, J., **Stratigraphy and facies of sediments and low-grade metasediments in the Shackleton Range, Antarctica,** *Polarforschung,* 1993 (Publ. 1994), 63(1), p.9-32, With German summary. 33 refs.

Numerous elements comprising the geology of the Shackleton Range are identified and their structural characteristics are described. Chronologies are noted and their relationships to one another are pointed out. The geological histories of at least seven named features and one glacier of the Range are discussed.

E-52862

Buggisch, W., Kleinschmidt, G., Kreuzer, H., Krumm, S., **Metamorphic and structural evolution of the southern Shackleton Range during the Ross Orogeny,** *Polarforschung,* 1993 (Publ. 1994), 63(1), p.33-56, With German summary. 42 refs.

The Shackleton Range can be divided into three major units: (1) the East Antarctic Craton and its sedimentary cover (Read Group and Watts Needle Formation); (2) the allochthonous Mount Wegener Nappe (Mount Wegener Formation, Stephenson Bastion Formation, and Wyeth Heights Formation); and (3) the northern belt (basement: Pioneer and Stratton Groups, sedimentary cover: Haskard Highlands Formation (allochthonous?), and Blaiklock Glacier Group). The northern units are thrust over the southern ones, the thrusting being related to the Ross Orogeny. The Mount Wegener Nappe, which appears to be a homogeneous tectonic unit, consists of a Precambrian basement (Stephenson Bastion Formation, Wyeth Heights Formation?) and a Cambrian cover (Mount Wegener Formation). Some questions are still open: the position of the Haskard Highlands Formation may be erratic or represent a tectonic sliver; the relation of the former Turnpike Bluff Group; and the origin of the crystalline basement west of Stephenson Bastion and others. (Auth.)

E-52863

Kleinschmidt, G., Buggisch, W., **Plate tectonic implications of the structure of the Shackleton Range, Antarctica,** *Polarfors-*

chung, 1993 (Publ. 1994), 63(1), p.57-62, With German summary. 30 refs.

In the southern Shackleton Range, all shear-sense indicators substantiate transport of the back-arc basin deposits making up the Mt. Wegener Nappe southwards onto the East Antarctic Craton. Consequently, the structure of the Read Mountains is interpreted as resulting from "foreland thrusting". Depending on the position of the assumed subduction zone, the basement of the northern Shackleton Range either was part of a different continent than that of the Read Mts. or represents part of the magmatic arc. Models for the Ross Orogen are discussed. Compressional kinematics normal to the orogen are known from North Victoria Land and the Shackleton Range. Strike-slip and transpression structures were not observed in the field. Therefore, primary bending of the Transantarctic and Shackleton branches of the Ross Orogen seems to be most probable. (Auth. mod.)

E-52875

Dirks, P.H.G.M., Hand, M., **Clarifying temperature-pressure paths via structures in granulite from the Bolingen Islands, Antarctica,** *Australian journal of earth sciences,* Apr. 1995, 42(2), p.157-172, Refs. p.171-172.

Granulites in the Bolingen Is. comprise two structural-lithological domains; the southern Bolingen Is. are dominated by felsic-mafic gneiss and a foliation with an east-plunging lineation that formed in response to compression (D_2), while the northern Bolingen Is. are dominated by sediments and a series of related foliations with a southwest-plunging lineation that formed in response to extension (D_3). The granulites preserve textures that record 300-500 MPa of decompression at elevated temperatures (>800°C). Most textures resulted from the overprint of D_2 by lower pressure D_3 assemblages, but decompression continued during and after D_3. Based on regional correlations it appears that D_2 compression took place at 1000 Ma, while D_{3-7} extension occurred 500 million years later. If correct, these correlations imply a more complicated thermal and exhumation history. Brittle events alternating with kinematically related, pervasive granulite-grade ductile events hint at temperature fluctuations during high-grade metamorphism in the southern Bolingen Is. (Auth. mod.)

E-52884

Pigg, K.B., Trivett, M.L., **Evolution of the glossopterid gymnosperms from Permian Gondwana,** *Journal of plant research,* Dec. 1994, 107(1088), p.461-477, Refs. p.474-477.

Understanding of the glossopterid gymnosperms from the Permian of Gondwana has recently been greatly enhanced through the study of anatomically preserved plant remains in cherts from several localities in Australia and Antarctica. Studies of *Glossopteris* leaves, leaf-stem attachment, stem structure and wood anatomy, *Vertebraria* roots, ovule- and pollen-bearing reproductive structures and putative glossopterid pollen and ovules demonstrate that the glossopterids were a diverse group of sophisticated gymnosperms. Comparative studies of different Permian chert floras show that while some glossopterid elements are widespread, other taxa appear to be more localized in their distribution. As information from petrified plant-bearing cherts becomes available, it can be used to reconstruct whole glossopterid plants and establish their paleogeographic distribution. (Auth.)

E-52886

DiVenere, V.J., Kent, D.V., Dalziel, I.W.D., **Early Cretaceous paleomagnetic results from Marie Byrd Land, West Antarctica: implications for the Weddellia collage of crustal blocks,** *Journal of geophysical research,* May 10, 1995, 100(B5), p.8133-8151, 60 refs.

A new 117 Ma paleomagnetic pole has been defined from the study of volcanic and plutonic rocks from eastern Marie Byrd Land (MBL). The new pole (185.6°E/56.8°S, A_{95}=8.7°) implies that the eastern portion of MBL was an integral part of Weddellia, which included the ancestral Antarctic Peninsula, Thurston I., and Ellsworth-Whitmore Mountains blocks of West Antarctica. This pole is generally similar to a 125 Ma pole from Thurston I. Both poles call for major clockwise rotation and poleward motion of eastern MBL and Thurston I. between the Early Cretaceous (125-117 Ma) and the mid-Cretaceous (110-100 Ma). It is proposed that in the Early Cretaceous, eastern MBL and the Eastern Province of New Zealand were part of a continuous active Pacific margin of Gondwana, connecting with the Antarctic Peninsula and distinct from western MBL, the Western Province of New Zealand, and North Victoria Land. These western terranes are thought to have accreted to Gondwana in the Devonian. (Auth. mod.)

E-52887

Cunningham, W.D., Dalziel, I.W.D., Lee, T.Y., Lawver, L.A., **Southernmost South America-Antarctic Peninsula relative plate motions since 84 Ma: implications for the tectonic evolution of the Scotia Arc region,** *Journal of geophysical research,* May 10, 1995, 100(B5), p.8257-8266, 40 refs.

This report quantifies the relative motion history between southernmost South America (SSA) and the Antarctic Peninsula (AP) by calculating and comparing SSA-Africa, AP-Africa and SSA-AP synthetic flow lines for 84-0 Ma. The flow lines were created using published poles of rotation and plate reconstruction software. The results indicate that since 84 Ma, SSA and AP have moved approximately westward relative to a fixed Africa; however, SSA's rate of westerly motion in that reference frame has been significantly more rapid than AP's rate. It is suggested that prior to 30 Ma and the opening of Drake Passage, components of interplate strike-slip and divergent motion were accommodated by intracontinental deformation that included strike-slip faulting, counterclockwise tectonic rotation, and continental extension in the southernmost Andes. The results indicate that the opening of the Scotia Sea was caused by plate-scale motions as SSA and AP drifted away from Africa at different velocities along different nonparallel trajectories. Subduction retreat along the South Scotia Ridge and South Sandwich arc and back arc spreading in the Scotia Sea contributed to the width of separation between SSA and AP across Drake Passage. (Auth. mod.)

E-52960

Birkenmajer, K., **Geology of Tertiary glacigenic deposits and volcanics (Polonia Glacier Group and Chopin Ridge Group) at Lions Rump (SSSI No.34), King George Island, West Antarctica,** *Polish Academy of Sciences. Bulletin. Earth Sciences,* 1994, 42(3), p.165-180, 26 refs.

The area of Lions Rump (SSSI No.34) on King George I. was geologically mapped in a scale of 1:5,000. Two lithostratigraphic groups are described, separated by an important fault: the Polonia Glacier Group (volcanic and volcanoclastic rocks: Eocene) in the north, and the Chopin Ridge Group (Upper Cretaceous and Oligocene volcanics, and Lower Oligocene glacial and glacio-marine deposits) in the south. (Auth.)

E-52961

Birkenmajer, K., **Quaternary geology at Lions Rump (SSSI No.34), King George Island, South Shetland Islands (West Antarctica),** *Polish Academy of Sciences. Bulletin. Earth Sciences,* 1994, 42(3), p.207-221, 20 refs.

Three generations of Late Holocene moraines and related glacifluvial deposits, postdating high raised beaches, are described from the area of Lions Rump, King George Bay, designated as a Site of Special Scientific Interest (SSSI No.34). Lichenometric dating using circular thalii of *Rhizocarpon geographicum* indicates that the first generation moraines were formed as a result of glacier advance in the second half of the 18th century. The second (prior to 1960) and the third (between 1988 and 1991) glacier advances produced the second and the third generations of the moraines, respectively. The Holocene history of the area is outlined. Comparison of dated Late Holocene glacier advances of King George Bay and Admiralty Bay on King George I. with those of Hope Bay, northern Antarctic Peninsula, gives a picture of instability of ice cover in maritime West Antarctica. The timing of glacier advances/surges depends principally on local conditions and is not correlatable among the three areas considered. (Auth.)

E-52964

Vaz Chaves, N., Masquelín, E., **Geology of Nebles Point, King George I.** [Geología de Punta Nebbless, Isla Rey Jorge - Shetland del Sur], *Montevideo. Instituto Antártico Uruguayo. Actividad scientífica 1986/87 (Scientific activity 1986-1987),* Jan. 1989, Vol.2, p.15-26, In Spanish with English summary. 8 refs.

DLC G845.A28

A geological study of Nebles Point (northeastern Fildes Peninsula) is discussed, covering exploration methods used, stratigraphy and petrographic analysis, and presenting morphological, lithological and structural data which were used in the compilation of a map of the area.

E-52969

Mäusbacher, R., **Early Quaternary relief and climatic history of the Fildes Peninsula in the South Shetland Islands, Antarctica** [Die jungquartäre Relief- und Klimageschichte im Bereich der Fildeshalbinsel Süd-Shetland Inseln, Antarktis], Heidelberger Geographische Arbeiten, Heft 89, Heidelberg, Germany, Roland Mäusbacher, 1991, 207p., In German with English summary. Refs. p.195-205.

DLC QE258.S6M38 1991

During the 1984-85 and the 1986-87 expeditions to the South Shetland Is. nine lakes were cored on Fildes Peninsula, King George I. The aim of this project was to obtain more detailed information about the glacial and climatic history of this area. Altogether 22 cores with lengths between 132 cm and 464 cm were sampled. Sedimentological, biostratigraphical and chemical analysis provide insights into Holocene deglaciation, sea level change and climatic history in this region. Details as to how and when these various factors established the geologic history of the Fildes Peninsula from 9,000 yr BP to about 100 yr BP are set forth, assessed, and interpreted. (Auth. mod.)

E-52972

Brook, E.J., Kurz, M.D., Ackert, R.P., Raisbeck, G., Yiou, F., **Cosmogenic nuclide exposure ages and glacial history of late Quaternary Ross Sea drift in McMurdo Sound, Antarctica,** *Earth and planetary science letters,* Mar. 1995, 131(1-2), p.41-56, 51 refs.

^{3}He, ^{10}Be and ^{26}Al surface exposure ages were determined for rock samples from late Quaternary drift sheets deposited on the coast of McMurdo Sound by the Ross Sea ice sheet. The youngest drift, previously believed to be Late Wisconsin in age, has exposure ages of 8-106 kyr (19 samples). These results suggest that the apparent 'Late Wisconsin' ice margin may represent a number of ice sheet advances during the last glacial period. ^{3}He exposure ages from analogous but stratigraphically older drift range from 104 to 567 kyr (seven samples), and clearly distinguish the youngest drift from older deposits. Comparison of ^{10}Be and ^{3}He concentrations in Ross Sea Drift quartz samples indicates significant ^{3}He loss in only one sample, suggesting that cosmogenic ^{3}He is generally retained in young antarctic quartz samples (exposure age <100 kyr) of appropriate grain size. In two of the five quartz samples analyzed, significant excesses of ^{26}Al relative to ^{10}Be preclude meaningful ^{26}Al exposure age calculations. These excesses may be due to nucleogenic ^{26}Al produced as a byproduct of uranium and thorium decay. (Auth. mod.)

E-52979

McDonald, G.D., Bada, J.L., **Search for endogenous amino acids in the Martian meteorite EETA79001,** *Geochimica et cosmochimica acta,* Mar. 1995, 59(6), p.1179-1184, 35 refs.

The antarctic shergottite EETA79001 is believed to be an impact-ejected fragment of the planet Mars. Samples of the carbonate (white druse) and the basaltic (lithology A) components from this meteorite have been found to contain amino acids at a level of approximately 1 ppm and 0.4 ppm, respectively. The detected amino acids consist almost exclusively of the L-enantiomers of the amino acids commonly found in proteins, and are thus terrestrial contaminants. There is no indication of the presence of α-aminoisobutyric acid, one of the most abundant amino acids in several carbonaceous chondrites. The relative abundances of amino acids in the druse material resemble those in antarctic ice, suggesting that the source of the amino acids may be ice meltwater. The level of amino acids in EETA79001 druse is not by itself sufficient to account for the 600-700 ppm of volatile C reported in druse samples and suggested to be from endogenous Martian organic material. However, estimates of total terrestrial organic C present in the druse material based on amino acid analyses and the organic C content of polar ice can account for most of the reported putative organic C in EETA79001 druse. (Auth.)

E-52982

Möller, P., Ingólfsson, O., **Gravel and sand flotation: a sediment dispersal process important in certain nearshore marine environments,** *Journal of sedimentary research,* Oct. 3, 1994, A64(4), p.894-898, 15 refs.

Small rafts of floating sediment, predominantly of granule and small pebble size, were observed along a tidewater coast on James Ross I. The sediment was lifted from the beach by the advancing tidewater and kept afloat by surface tension. The current transported the rafts at least 100-150 m off the beach, where the rafts broke up due to wind agitation of the sea surface, and the gravel sank. This process can transport considerable volumes of sediment from the beach; it is estimated that flotations at the Naze launch ca. 500 kg per km of shoreline per tidal cycle during calm and dry weather conditions, which for one summer season might total 0.022 tons of sediment per meter of shoreline. The resulting sediments and sedimentary structures are concluded to be similar to those resulting from iceberg, sea ice, and algae rafting, and sediment gravity flows. (Auth.)

E-52984

Grantham, G.H., Thomas, R.J., Mendonidis, P., **Contrasting P-T-t loops from southern East Africa, Natal and East Antarctica,** *Journal of African earth sciences,* Oct. 1994, 19(3), p.225-235, With French summary. Refs. p.233-235.

Thermobarometric data are compared with the ≈1100 to ≈500 Ma polyphase mobile belts from three separate areas of Africa and Antarctica, which originally lay in close proximity within Gondwana. These areas are all characterized by high-grade gneiss terranes formed at ≈1100 Ma (Grenvillian), which were subsequently reworked to a greater or lesser extent at ≈500 Ma (Pan-African). In Zambia, Malawi, Zimbabwe and western Dronning Maud Land peak metamorphic conditions at high temperatures and pressures were attained between 1100 and 850 Ma, followed by isothermal decompression (ITD). In Natal and Mozambique, voluminous collision-related granitoid intrusions emplaced between 1200 and 1000 Ma gave rise to high-temperature, moderate pressure metamorphism, with subsequent near-isobaric cooling (IBC). (Auth. mod.)

E-52986

Kelly, S.R.A., Ditchfield, P.W., Doubleday, P.A., Marshall, J.D., **Upper Jurassic methane-seep limestone from the Fossil Bluff Group forearc basin of Alexander Island, Antarctica,** *Journal of sedimentary research,* Apr. 3, 1995, A65(2), p.274-282, 48 refs.

An anomalous Upper Jurassic limestone bed, 3 m thick, is present within the volcaniclastic infill of a forearc basin exposed on Alexander I. The limestone, formally designated the Gateway Pass Limestone Bed, contains laminated crusts and blocks, including hardgrounds, showing radial-fibrous and botryoidal calcite cements. Carbon isotope values are very negative (δ^{13}C of -33.5 per mill to -44.6 per mill PDB) indicating a methane-oxidation origin for the carbonate. The limestone bed formed around a submarine cold seep in the Antarctic Peninsula forearc basin adjacent to the accretionary prism. In contrast to the adjacent nearly barren sea floor, the limestone also yields a "benthic island" assemblage containing abundant gastropods and bivalves. The seep is directly comparable to certain Jurassic seeps at the convergent margin of the northeast Pacific, and both are related to subduction at the eastern proto-Pacific margin. (Auth.)

E-52989

Pan, G.X., Cheng, J.M., **Characteristics of elemental and clay mineralogical composition of some primitive soils from George Island, Antarctica,** *Chinese science bulletin,* Sep. 1994, 39(17), p.1481-1484, 5 refs.

Following a study on the basic physicochemical properties of some primitive soils from Penguin I., the authors present further data of elemental and clay mineral composition in an attempt to illustrate the features of soil components. The properties of 5 samples studied are presented in a table. (Auth.)

E-52993

Lindström, S., **Early Late Permian palynostratigraphy and palaeo-biogeography of Vestfjella, Dronning Maud Land, Antarctica,** *Review of palaeobotany and palynology,* May 1995, 86(1/2), p.157-173, 31 refs.

The preliminary results of a palynological investigation of 62 samples from the southern section of a sedimentary sequence exposed at Fossilryggen in the Kraul Mountains are reported. The sequence, which is cut by dolerite dykes, is considered to have been deposited in a near-shore marine environment. Palynomorphs recovered show high degrees of thermal alteration and various states of preservation; 55 palynomorph taxa have been identified. Also present are acritarchs and prasinophycean algae. Palaeobiogeographically the palynoflora is typical for southern Gondwana and it is correlated primarily with assemblages of similar composition in Antarctica, South Africa and Australia. Comparisons are also made with assemblages from the northern margins of Gondwana and Eurameria, with which palynostratigraphical correlations are more difficult. (Auth. mod.)

E-53000

Yao, X.L., Taylor, T.N., Taylor, E.L., **Corystosperm pollen organ *Pteruchus* from the Triassic of Antarctica,** *American journal of botany,* 1995, 82(4), p.535-546, Refs. p.545-546.

The permineralized corystosperm pollen organ *Pteruchus* is described from the early Middle Triassic of Antarctica. *Pteruchus fremouwensis* consists of an axis bearing numerous helically arranged microsporophylls, each of which terminates in a distal flattened head. Spherical to elliptical secretory cavities are present in the ground tissue of the axis, microsporophyll, and pollen sac wall. The basal stalk of the microsporophyll is vascularized by a C-shaped strand that gives rise to a midvein and numerous lateral veins in the distal head. At least 38 pollen sacs are borne on the abaxial surface of the microsporophyll head, arranged in pairs on either side of lateral veins. Each pollen sac is sessile, elongated, and uniloculate. The Triassic specimens are the first structurally preserved pollen organs of the *Pteruchus* type and can be related to the associated corystosperm stem and leaf genera based on the presence of unique secretory cavities. (Auth. mod.)

E-53009

Igarashi, A., Numanami, H., Tsuchiya, Y., Harada, N., Fukuchi, M., Saito, T., **Radiocarbon ages of molluscan shell fossils in raised beach deposits along the east coast of Lützow-Holm Bay, Antarctica, determined by accelerator mass-spectrometry,** NIPR Symposium on Polar Biology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Jan. 1995, p.154-162, 18 refs.

Radiocarbon ages of molluscan shell fossils embedded in raised beach deposits were measured at 12 locations on Ongul I., Langhovde and Skallen, along the east coast of Lützow-Holm Bay. Radiocarbon ages are: 34350±550, 35040±480, 36180±630, and 37420±720 years B.P. for Ongul I., 3660±100, 33410±510, 34940±460, and 37200±910 years B.P. for Langhovde, and 3180±90, 3790±180, 4720±90, and 7810±130 years B.P. for Skallen, respectively. (Auth.)

E-53010

Harada, N., Handa, N., Fukuchi, M., Ishiwatari, R., **Hydrocarbon record of marine sediment core from Lützow-Holm Bay, Antarctica,** NIPR Symposium on Polar Biology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Jan. 1995, p.163-176, Refs. p.174-176.

The vertical variation pattern of organic carbon (OC) in a sediment core from Lützow-Holm Bay was similar to that of total nitrogen (TN). The OC and TN values decreased from 0.3 to 0.02 and 0.046 to 0.004% by weight from the surface to the bottom, respectively. ^{14}C age showed a smooth pattern of change from about 3000 BP at the surface to 14,000 BP at the bottom (129 cm), except for an abrupt age gap at a depth of 70 cm. Normal-alkanes ranging from C_{15} to C_{33} were found with a predominance of C_{21} in the low hydrocarbon content sections at depth of 0-5, 55-60 and 120-125 cm. Long-chain *n*-alkanes (C_{22}, C_{23}, C_{24}) were relatively dominant in the high hydrocarbon content sections at depths of 45-50 and 90-95 cm. (Auth. mod.)

E-53018

Sugden, D.E., Denton, G.H., Marchant, D.R., **Landscape evolution of the Dry Valleys, Transantarctic Mountains: tectonic implications,** *Journal of geophysical research,* June 10, 1995, 100(B7), p.9949-9967, 72 refs.

A new interpretation of the landscape evolution and tectonic history of the Dry Valleys area of the Transantarctic Mountains is based on geomorphic mapping of an area of 10,000 km^2. The landforms are dated mainly by their association with volcanic ash and glaciomarine deposits, which permits a reconstruction of the stages and timing of landscape evolution. Following a lowering of base level about 55 mya, there was a phase of rapid denudation associated with planation and escarpment retreat, probably under semiarid conditions. Eventually, downcutting by rivers, aided in places by glaciers, graded valleys to near present sea level. The main valleys were flooded by the sea in the Miocene during a phase of subsidence before experiencing a final stage of modest upwarping near the coast. There has been remarkably little landform change under the stable, cold polar conditions of the last 15 m.y. It is suggested that denudation reflects the differences in base level caused by high elevation at the time of extension due to underplating and the subsequent role of thermal uplift and flexural isostasy. (Auth. mod.)

E-53019

Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report, Ricci, C.A., ed, **Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94),** *Terra Antartica,* 1994, 1(3), p.481-571, Refs. passim. For individual papers see E-53020, E-53021, E-53025, E-53028 through E-53030, E-53034 through E-53040, F-53027, L-53022 through L-53024, L-53026 and L-53031 through L-53033.

Two meetings promoted by the international projects Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) and Lithospheric Investigations in the Ross Sea Area (LIRA), and sponsored by the Programma Nationale di Richerche in Antartide, were held in Gradisca d'Isonzo (Trieste, Italy). The ANTOSTRAT Ross Sea Regional Working Group Meeting from May 31 to June 2, 1993 brought together about 30 people from 8 countries working in the Ross Sea area. The aim was to discuss results, problems, and multinational cooperative research projects. The LIRA Workshop immediately followed (June 3-5, 1993) and was attended by about 70 scientists from 7 countries. Seventeen contributions which were presented during the LIRA workshop are published herein as papers, short notes and abstracts. They cover geoscientific investigation of the Transantarctic Mountains and the adjacent Ross Sea depression. Two contributions which had been submitted to *Terra Antarctica* were also included in this special issue due to their correlation with the themes of the two meetings.

E-53020

Cooper, A.K., Brancolini, G., Davey, F.J., **ANTOSTRAT Ross Sea Regional Working Group Meeting,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.483-490, 8 refs.

The Ross Sea regional working group (RWG) of the ANTOSTRAT is one of five regional working groups established to compile, collate and analyze geologic and geophysical data from the sedimentary sections occurring over the entire antarctic continental margin. The principal objective of the RWG meeting was to bring together researchers with their geoscience data from the Ross Sea continental margin and adjacent areas to discuss, verify and characterize the seismic and geologic data used for regional map compilations. This report outlines the topics discussed at the meeting, and briefly summarizes some of the unresolved issues, many of which may apply to other areas of the antarctic continental margin and similar north polar margins. (Auth. mod.)

E-53021

Tessensohn, F., Della Vedova, B., Ricci, C.A., **Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.491-494.

This workshop was attended by about 70 scientists from Germany, Italy, Japan, Netherlands, New Zealand, Russia and the USA, all of them involved in geoscience projects in the Ross Sea area. The workshop was meant to be a "thematic" meeting on the crustal structures at the transition between the Ross Sea Depression and the Transantarctic Mountains and, based on these structures, the genetic interpretation of these major tectonic units.

E-53025

Blankenship, D.D., Bell, R.E., CASERTZ Group, **Corridor aerogeophysics in the Interior Ross Embayment of West Antarctica,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.507-508, 6 refs.

Understanding the lithospheric framework both along and across the West Antarctic rift system is critical for determining the geological controls on the dynamics of the West Antarctic ice sheet, and for deciphering the evolution of the Pacific margin of Gondwana. An experiment entitled Corridor Aerogeophysics of the Southern and Eastern Ross Transect Zone (CASERTZ) is an attempt to establish this framework. The experiment includes airborne radar and surface altimetry as well as airborne gravity and aeromagnetic measurements across selected corridors within the West Antarctic rift system. At present the proposed corridors cover the western portion of the Byrd Subglacial Basin as well as eastern and southern portions of the Interior Ross Embayment.

E-53027

Stern, T.A., Ten Brink, U.S., Beaudoin, B.C., Bannister, S.C., **Seismic reflection experiments on the Ross Ice shelf: 1985-1991,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.513-516, 11 refs.

Three seismic reflection experiments on the Ross Ice Shelf are briefly described. Seismic reflection exploration on a thick floating ice shelf presents a unique challenge in terms of both data acquisition and processing. Conventional acquisition methods were used in the 1985 survey including drilled shot holes and moving cables and geophones by skidoo. In the latest experiment, the SERIS project of 1990-91, thermal drilling of shot holes and a towed ice streamer were used. Results are varied and appear to depend on the intensity and character of intra-ice and seafloor multiples that are created by the dynamite shots. Some of the features observed in the geology beneath the ice shelf include unconformities, basement faulting, bottom simulating reflector and a possible base of the crust (Moho) reflector. (Auth.)

E-53028

Cooper, A., Brancolini, G., **Stratigraphic record of the Ross Sea continental shelf,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.517-520, 13 refs.

It is widely recognized that sedimentary sequences on all continental margins have sigmoidal geometries that are partly controlled by relative changes in sea level, tectonics, sediment supply, and sediment compaction. On polar margins such as the Ross Ice Shelf where massive ice sheets have existed, other factors that include flexure by ice-loading, sediment erosion/redistribution by grounded ice sheets, ice-loading of sediment, and ice-controlled sediment supply, have also controlled these geometries. On polar margins, the relative times over which these processes have acted (i.e. the relative amount of glacial and non-glacial times) have further controlled the degree of shelf overdeepening and foredeepening, which in turn affects the depositional environments. (Auth.)

E-53029

Brancolini, G., Coren, F., **Seismic facies analysis in the area of the Cape Roberts drilling site,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.521-522, 3 refs.

The western flank of the Victoria Land Basin (VLB) was uplifted and tilted during various rifting stages, which caused almost the entire sedimentary sequence to outcrop on the sea bottom. This area therefore is the most suitable place for sampling the oldest Ross Sea sediments with relatively shallow drilling. Some important considerations on the geology in the Robert Point site can be made by interpretation of the multichannel lines acquired by OGS during the 1990-91 antarctic expedition. Starting from the sea bottom, five seismic units are distinguished and described.

E-53030

Busetti, M., **New constraint for the age of unconformity U6 in the Ross Sea,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.523-526, 13 refs.

In the Eastern Basin of the Ross Sea there is seismic evidence of a very strong and clear reflector (U6) that marks an important event whose age and origin are under debate. A new constraint on the age of U6 has been identified by reprocessing of multichannel seismic data. The author shows that unconformity U6 onlaps a structural high (Central High) before reaching DSDP site 270. Hence U6 is older than the sediments found at DSDP site 270, whose age at the bottom of the hole is older than 26 Ma, according to the previous correlation by Hinz and Block (1984). (Auth.)

E-53034

Armienti, P., Francalanci, L., Salvioli, E., **Petrogenesis of the McMurdo Volcanic Group and its bearing on the recent evolution of the crust-mantle system in northern Victoria Land,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.533-535, 10 refs.

In northern Victoria Land, ultramafic cumulates related to deep fractionation stages of Cenozoic magmas are often encounterd among the suites of xenoliths carried by the basaltic lavas of the McMurdo Volcanic Group. Cenozoic volcanics crop out in an area between the Ross Sea rift system and the Transantarctic Mountains, which represent the uplifted shoulder of the rift; they have an Na-alkaline composition related to the extensional environment in which they are found. This note presents the results of geochemical and petrologic studies performed on two suites of wherlites, clinopyroxenites and megacrysts of augite and kaersutite that were collected at Browning Pass and on Deception Plateau.

E-53035

Wilson, T.J., **Structural kinematic studies in the Transantarctic Mountains, southern Victoria Land,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.537-538, 7 refs.

Structures developed at upper crustal levels during the Mesozoic paleotectonic and Cenozoic neotectonic evolution of the Transantarctic Mountains (TAM) consist of brittle fault and fracture arrays. Because major faults within the TAM are typically covered by glaciers, this study concentrated on outcrop-scale brittle structures in exposures along and across the inferred position of major structures. The study has revealed that striated mesoscopic fault planes are ubiquitous in all rock types. Throughout large segments of the TAM, fault sets have consistent orientation and displacement patterns, and kinematic shortening and extension axes graphically reconstructed from the fault populations show uniform orientations. This demonstrates that the mesoscopic faults record the regional strain patterns along the TAM rift margin. Igneous dike swarms and volcanic fissures and vents can also be used to determine stress patterns and regional extension directions in the crust at the time of dike emplacement. (Auth. mod.)

E-53036

Balestrieri, M.L., Bigazzi, G., Ghezzo, C., Lombardo, B., **Review of apatite fission-track data from northern Victoria Land and a first indication of a Late Cretaceous uplift phase,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.539-540, 16 refs.

Several explanations proposed for the uplift of the Transantarctic Mountains (TAM) include a "simple shear model" which involves a shallow crustal penetrative detachment zone dipping westward beneath the TAM front and causing an asymmetric passive rifting; a "flexural uplift model" in which isostasy, erosion and the "Vening Meinesz effect" all play a role; and a "delayed phase change model" where the uplift is due to the delayed effects of the overriding by East Antarctica of an anomalously hot asthenosphere forming under West Antarctica. The uplift of the TAM is related to the separation of East and West Antarctica and to the breakup of Gondwana. Many papers point out the episodic character of the uplift of this chain; early phases of uplift-denudation have been recorded in Early Cretaceous and Late Cretaceous, but the main phase was initiated in the Paleogene. Other observations summarized in Fitzgerald (1992) suggest that the TAM were uplifted also in the Neogene.

E-53037

Luyendyk, B.P., Smith, C.H., Van der Wateren, F.M., **Glaciation, block faulting, and volcanism in western Marie Byrd Land,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.541-543, 20 refs.

Western Marie Byrd Land (MBL) is characterized by block faulted topography and scattered outcrops of Late Cenozoic volcanic rocks. Faulting, volcanism, and ice sheet development appear to have progressed in parallel. The authors have made three expeditions to western MBL including five weeks in the northern Ford Ranges during 1989-90 and eight weeks during 1990-91 under the U.S. Antarctic program. During the 1992-93 season they participated in the German GANOVEX VII expedition to King Edward VII Peninsula aboard the icebreaker *Polar Queen.* During this expedition the authors made geological, glacial geology, and gravity observations which are summarized in this note.

E-53038

Lawver, L.A., Gahagan, L.M., **Constraints on timing of extension in the Ross Sea region,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.545-552, Refs. p.551-552.

Prior to 105 Ma, much of the Pacific margin of Gondwana was a convergent margin; geologically, there is little or no evidence for extension in the New Zealand region or the Ross Sea until after 105 Ma. Previous Late Cretaceous to recent reconstructions of the Antarctica/Australia/New Zealand region have been based on assumptions involving the plate circuit between "West" New Zealand and "East" New Zealand. The authors' new model uses a different free boundary to close the plate circuit. Instead of unconstrained motion in the Ross Sea Embayment and along the Alpine Fault, they allow motion between Lord Howe Rise and the Challenger Plateau. Their model results in a much simplified evolution of the Southwest Pacific region and supports little (<50 km) latest Cretaceous (after 85 Ma) or Cenozoic extension in the Ross Sea Embayment, compatible with the seismic stratigraphy of the region. It is concluded that most of the seismically observed extension in the Ross Sea region occurred between 105 and 85 Ma. (Auth. mod.)

E-53039

Tessensohn, F., **Ross Sea region, Antarctica: structural interpretation in relation to the evolution of the southern ocean,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group.

Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.553-558, Refs. p.557-558.

The tectonic development in the onshore areas of Victoria Land is compared to the offshore development in the Ross Sea. The structural evolution of both areas is compared to the history of the southern ocean to the north. Here two areas of "symmetric spreading", one along the Southeast Indian Ridge between East Antarctica and Mainland Australia and the second along the Pacific-Antarctic Ridge between New Zealand/Campbell Plateau and Marie Byrd Land, are separated by a wide zone of transform movements between Tasmania and Victoria Land/Ross Sea. It is suggested that the transform movement was accommodated in its early stages by a terrestrial strike-slip system. The Rennick faults of northern Victoria Land and some of the basin limits in the Ross Sea appear to have been formed during this early event.

E-53040

Della Vedova, B., Brancolini, G., Pellis, G., ACRUP-1 Research Group, **Geotraverse ACRUP-1 Experiment (IX Italian Antarctic Expedition 1993-94),** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.559-570, 5 refs.

The Antarctic Crustal Profile 1 (ACRUP-1) is a multidisciplinary international research project in the Ross Sea area. The project was carried out during the summer of 1993-94 within the IX Italian Antarctic Expedition. The main target of the research was the investigation of the crustal and subcrustal structures at the transition between the Ross Sea depression and the western border of the East Antarctic craton. The project included onshore and offshore seismic experiments. Two traverses were carried out: the first, across the Transantarctic Mountains, was about 350 km long from the Victoria Land Basin to the Eastern Basin. The two transects together constitute a unique data set across the Transantarctic Mountains and Ross Sea depression areas. The expected results will help to better understand the formation mechanisms of the Ross Sea rift system. (Auth. mod.)

E-53078

Collinson, J.W., Hammer, W.R., **Antarctica's place in Gondwanaland,** *Augustana College Library Publications,* 1992, No.36, Earth interpreters: F.M. Fryxell, geology, and Augustana. Edited by D.A. Schroeder and R.C. Anderson, p.123-131, 16 refs.

DLC QE38.E27

The principal subjects of this article are the antarctic vertebrate fossils and their geologic setting. Gondwanaland and the the Gondwana sequence are discussed, along with the history of the Transantarctic Basin and of Triassic vertebrate studies in Antarctica. The Triassic faunas of Antarctica and their depositional setting are described.

E-53081

Giret, A., Leyrit, H., Lauriat-Rage, A., Grégoire, M., Carriol, R.P., Lozouet, P., **Kerguelen Miocene: Mont Rond marine fauna and its geological and paleoclimatological implications** [Miocène des Kerguelen: la faune marine du Mont Rond et ses implications géologiques et paléoclimatologiques], *Académie des sciences, Paris. Comptes rendus. Série II,* Sep. 22, 1994, 319(6), p.719-726, In French with abridged English version. 22 refs.

In the Cap Mac Lear cliffs, near Mont Rond, lies the most important Kerguelen oceanic deposit of Miocene age. It yields molluscs and crustaceans. Their vague Tertiary palaeontologic age has been constrained to the lower and mid-Miocene thanks to isotopic datings of the upper and lower series of basalts. The fossil association includes opportunist species with suspensivorous, detritivorous and carnivorous feeding regime, and does not depend on a specific bathymetric zone. It shows some similarities with the Miocene to Present New Zealand fauna, which is a result of the establishment of the circumpolar stream. Nevertheless, the question of its sudden disappearance from Kerguelen shores may be evidenced by the palaeoclimatic data which have been obtained both in New Zealand and on the Kerguelen Plateau. (Auth. mod.)

E-53091

Zheng, X.S., Sàbat, F., Casas, J.M., Pallàs, R., **Petrography and mineralogy of the Mesozoic-Cenozoic volcanic rocks from the central part of Livingston Island, West Antarctica,** *Antarctic Research (Chinese edition),* Mar. 1995, 7(1), p.1-16, In Chinese with English summary. 19 refs.

The Middle-Late Cretaceous volcanoclastic rocks outcropped on the central part of Livingston I. include heteromict lapilli-tuffs, lapillistone and agglomeratic breccias predominantly andesitic in composition. Olivine basalts with holocrystalline porphyritic texture are mainly found at Shirreff Point. Most basaltic andesite and andesite outcropped in Central Livingston and Hannah Point are finely crystalline with mino-microporphyritic texture. The holocrystalline porphyritic olivine basalts and pyroclastic rocks are the components of Pleistocene to recent volcanic activities. On the whole, the mineral association, plagioclase+pyroxene(+olivine)+iro opaque, is very similar in distinctive lavas; however, the content of minerals is different. The plagioclase phenocrysts are usually with normal zoning, the Or and Ab components increase and An decreases with increasing SiO_2 content of rocks and the composition of the phenocryst margin is almost the same as that of plagioclases in matrix. (Auth. mod.)

E-53092

Wang, D.D., Chen, Y.H., **Inspiration from study of antarctic meteorites. V. The chemical composition of antarctic meteorites and their classification,** *Antarctic Research (Chinese edition),* Mar. 1995, 7(1), p.17-24, In Chinese with English summary. 19 refs.

The authors report concentrations of 13 elements in the metal of 52 antarctic iron meteorites and their classification based on the structures and their Ga, Ge, Ni, Ir and other trace element contents. The 52 iron meteorites assigned to chemical group consist of 16 of IAB, 12 of IIAB, 1 of IIE, 3 of IIAB, 1 of IIICD, 1 of IVA and 18 of ungrouped irons. The IAB, IIICD and IIE iron meteorite groups are considered to be of nonmagmatic origin. Nonmagmatic IAB, IIICD and IIE irons formed as individual pools of a chondritic body. The other groups, IIAB, IIIAB and IVA, show evidence of having originated by fractional crystallization of a metallic magma. The slopes on element-Ni trends are generally higher in magmatic than in the nonmagmatic groups. (Auth. mod.)

E-53101

Jansen, J., Brooks, C.R., **Microstructural analysis of the antarctic iron meteorite 'Inland Forts',** *Microstructural Science,* 1992, Vol.20, Annual Technical Meeting of the International Metallographic Society, 25th, Denver, Colorado, 1992. Proceedings. Metallographic characterization of metals after welding, processing and Service, edited by W.R. Kanne, Jr., G.W.E. Johnson, J.D. Braun, and M.R. Louthan, Jr., p.281-294, 11 refs.

DLC TN689.2.I5512

The Inland Forts Iron meteorite (ILD 83500) was found in Antarctica in 1982. It contains about 19% Ni and is classified as a type IVB ataxite. The microstructure consists of about 8% of particles of ferrite associated with $(Fe, Ni)_3P$ particles, in a matrix with a banded structure. The banding is caused by a fine two-phase structure of different orientations associated with its parent, massive martensite. The martensite decomposed upon reheating of the meteorite at some time in its preterrestrial history. (Auth.)

E-53104

Möller, P., **Subrecent moraine ridge formation on Cuff Cape, Victoria Land, Antarctica,** *Geografiska annaler,* 1995, 77A(2), p.83-94, 11 refs.

A small bedrock ridge called Cuff Cape, protruding from an ice field in the inner part of Granite Harbour, carries a system of moraine ridges. Based on studies of contemporary processes along the present ice margin, sediment facies states of logged trenches and the morphology of the moraines, it can be concluded that moraines at low altitudes are composed of sediments deposited in fluvial troughs and meltwater ponds along a frontal glacier apron. The sediments were primarily deposited as debris flow diamictons, generated from melted-out sediments from basal debris bands and sorted sediments deposited as traction load and suspended load sediments in the marginal ponds. These sediments were in a frozen state, later glaciotectonically thrust and stacked into moraine ridges during minor readvance stages. The largest moraine, covering a narrow retreat zone, was formed along the terrestrial ice margin by means of push and stacking of frontal apron diamictons. This moraine also carries superimposed minor ridges along its proximal slope, suggesting frequent readvance stages. (Auth. mod.)

E-53126

Stump, E., et al, **Reconnaissance geologic map of the Welcome Mountain Quadrangle, Transantarctic Mountains, Antarctica,** U.S. Antarctic Research Program Welcome Mountain Quadrangle Antarctic Geologic Map A-14, Reston, VA, U.S. Geological Survey, 1989, 1 sheet, 15 refs.

Four map units are described and explained: from the Jurassic, the Kirkpatrick Basalt; from the Jurassic and Triassic, the Ferrar Dolerite and Section Peak Formation undifferentiated; from the Ordovician and Cambrian, the Granite Harbour Intrusives; and from the Cambrian(?) or Proterozoic(?), the Wilson metamorphics-metasediments. Structural characteristics of the region are given and various rock types are identified.

E-53129

Zastawniak, E., **Upper Cretaceous leaf flora from the Błaszyk Moraine (Zamek Formation), King George Island, South Shetland Islands, West Antarctica** [Górnokredowa flora liściowa z Moreny Błaszyka (formacja Zamek), Wyspa Króla Jerzego, Archipelag Południowych Szetlandów, Antarktyka Zachodnia], *Acta palaeobotanica,* 1994, 34(2), p.119-163, In Polish with English summary. Refs. p.149-154.

In the tuff sandstones and conglomerates of Błaszyk Moraine, Admiralty Bay, leaf impressions occur of the Zamek Formation, the uppermost part of the Baranowski Glacier Group. The age of this group lies between 77±4 Ma (Santonian-Campanian) and 66.7±1.5 Ma (Maastrichtian). The leaf remains of angiospermous plants predominate in the taphocoenosis examined. There are also some impressions of *Pteridophyta* and one of a conifer *(Araucaria* or *Podocarpaceae).* Among angiosperms three new taxa were distinguished. Most leaves are magnoliaephyll, protophyll and laurophyll morphotypes, but pentalobaphyll and acrodromophyll morphotypes also occur. The *Magnoliidae* and *Hamamelididae* are the dominant group; some *Dilleniidae* and *Rosidae* are present as well. The Upper Cretaceous communities from the Błaszyk Moraine were represented on the lower parts of slopes and the bases of high volcanoes by magnoliaceous-laurophyllous evergreen rain forests. Above these woodlands, on the high slopes of volcanoes, open deciduous *Nothofagus* forest occurred with coniferous trees and ferns. Physiognomic analysis of the leaf remains from the Błaszyk Moraine suggest that a relatively mild, rather dry, mesothermic type of climate prevailed.

E-53140

Marfil, R., López Martínez, J., Arche, A., **Petrology and provenance of the Miers Bluff Formation, Livingston I.** [Nuevos datos sobre la petrología y procedencia de la Formación Miers Bluff, Isla Livingston, Islas Shetland del Sur], *Geogaceta,* Dec. 1994, No.16, p.126-128, In Spanish with English summary. 13 refs.

The turbidites of the Miers Bluff Formation have been petrologically analyzed and some compositional parameters have been calculated. The use of several ternary diagrams allow for some provenance speculations such as a source area of low metamorphic composition with progressive influence of dykes and volcanic rocks. Albitization of feldspars in parts of the section poses a difficulty for an accurate source area reconstruction. (Auth.)

E-53142

Jull, A.J.T., Eastoe, C.J., Xue, S., Herzog, G.F., **Isotopic composition of carbonates in the SNC meteorites Allan Hills 84001 and Nakhla,** *Meteoritics,* May 1995, 30(3), p.311-318, Refs. p.317-318.

The authors have measured the $^{13}C/^{12}C$ and $^{14}C/^{12}C$ ratios in CO_2 released by acid etching of the carbonate-bearing SNC meteorites Allan Hills 84001 and Nakhla. Most of the C released is strongly enriched in ^{13}C. In 10 out of 12 samples, 15 per mill$<\delta^{13}C<$55 per mill. Terrestrial values of carbonate $\delta^{13}C$ from weathering products are generally between -10 and +10 per mill. Two leachate samples especially rich in ^{13}C, ALH 84001,27 and Nakhla 25, have elemental Si/Mg ratios much lower than those of the bulk meteorites and ^{14}C activities that are much lower than the values expected for terrestrial carbonates. The former observation indicates that these leachates consist primarily of carbonates and, less likely, phosphates. The latter observation implies that heavy C was introduced not by terrestrial weathering but by extraterrestrial processes. For ALH 84001,121 (sample 27) and Nakhla (BM 1913,26) $\delta^{13}C=+41$ per mill and +35 per mill, respectively. The authors infer that the C in the carbonates retains an extraterrestrial isotopic signature, but probably not O, due to its ease of isotopic exchange. (Auth.)

E-53143

Wang, M.S., Lipschutz, M.E., **Volatile trace elements in antarctic ureilites,** *Meteoritics,* May 1995, 30(3), p.319-324, Refs. p.323-324.

The authors report data for Ag, Au, Bi, Cd, Co, Cs, Ga, In, Rb, Sb, Se, Te, Tl, U and Zn in 15 antarctic ureilites. Contents of these mainly volatile trace elements in antarctic ureilites are roughly comparable to those in the four known falls. Trends exhibited by these data apparently reflect geochemical fractionations in parental magma(s), which were closed to loss of vapor. Subsequent events (e.g., shock and crystallization) do not seem to have affected the contents of these elements. (Auth.)

E-53144

Zhou, B., Hensen, B.J., **Inherited Sm/Nd isotope components preserved in monazite inclusions within garnets in leucogneiss from East Antarctica and implications for closure temperature studies,** *Chemical geology,* Apr. 5, 1995, 121(1-4), p.317-326, Refs. p.325-326.

Analysis of a garnet from a leucogneiss dyke in the northern Prince Charles Mountains reveals that unleached garnet concentrates and the monazite inclusions (as represented by the leachates) define an apparent isochron of 1150±30 Ma (MSWD=1.88), which represents a mixing age of inclusions preserving their inherited Sm-Nd isotopic systematics. In contrast, analyses of the leached garnet concentrates yield much younger ages of 630 to 555 Ma. Model calculations show that the presence of as little as 0.01 wt% of monazite inclusions would swamp the Sm-Nd isotope signature of the garnet concentrates. This very low level of contamination is beyond the reach of physical purification processes and, without leaching, contamination is inevitable in inclusion-bearing garnets. Such contamination can lead to older apparent ages than those of garnet formation, and thus has profound implications for Sm-Nd as well as U-Pb garnet chronometry. (Auth. mod.)

E-53150

Mahoney, J.J., et al, **Geochemical characteristics of lavas from Broken Ridge, the Naturaliste Plateau and southernmost Kerguelen Plateau: Cretaceous plateau volcanism in the southeast Indian Ocean,** *Chemical geology,* Mar. 1, 1995, 120(3-4), p.315-345, 103 refs.

Lavas from several major bathymetric highs in the eastern Indian Ocean that are likely to have formed as Early to Middle Cretaceous manifestations of the Kerguelen hotspot are predominantly tholeiitic; so too are glass shards from Eocene to Paleocene volcanic ash layers on Broken Ridge, which are believed to have come from eruptions on the Ninetyeast Ridge. The early dominance of tholeiitic compositions contrasts with the more recent intraplate alkalic volcanism of the Kerguelen Archipelago. Isotopic and incompatible-element ratios of the plateau lavas are distinct from those of Indian mid-ocean ridge basalts. On oceanic islands such as the Kerguelen Archipelago, Pitcairn and Tristan da Cunha, the plateau lavas with extreme isotopic characteristics also have relative depletions in Nb and Ta. These characteristics probably reflect the shallow-level incorporation of continental lithosphere in either the head of the early Kerguelen plume or in plume-derived magmas, and suggest that the influence of such material diminished after the period of plateau construction. (Auth. mod.)

E-53151
Li, Z.X., Zhang, L.H., Powell, C.M., **South China in Rodinia: Part of the missing link between Australia-East Antarctica and Laurentia?,** *Geology,* May 1995, 23(5), p.407-410, 39 refs.

Stratigraphic correlations and tectonic analysis suggest that the Yangtze block of South China could have been a continental fragment caught between the Australian craton and Laurentia during the late Mesoproterozoic assembly of the supercontinent Rodinia. The Cathaysia block of southeast China may have been part of a 1.9-1.4 Ga continental strip adjoining western Laurentia before it became attached to the Yangtze block around 1 Ga. This configuration provides a western source region for the clastic wedges in the Belt Supergroup of western North America which contain detrital grains of 1.8-1.6 Ga and 1.22-1.07 Ga. The breakup of Rodinia around 0.7 Ga separated South China (Yangtze plus Cathaysia blocks) from the other continents. (Auth.)

E-53152
Hensen, B.J., Zhou, B., **Retention of isotopic memory in garnets partially broken down during an overprinting granulite-facies metamorphism: implications for the Sm-Nd closure temperature,** *Geology,* Mar. 1995, 23(3), p.225-228, 20 refs.

Garnets from an early granulite event that have partially broken down to orthopyroxene-bearing assemblages during a second regional granulite-facies metamorphism were used to test the closure temperature of the Sm-Nd system in garnet. The garnets from Søstrene I. in Prydz Bay retain a memory of both the physical conditions of their formation and their Sm-Nd age, notwithstanding an effective diameter for diffusion of only 1 mm. Because only minor isotopic resetting of these garnets has taken place during the overprinting granulite event, the closure temperature for the Sm-Nd system in garnet in the present case must be >700-750°C. The results show that chronological constraints are essential for the unambiguous interpretation of reaction textures in terms of thermotectonic evolution. The garnet Sm-Nd dating method is particularly well suited for this purpose. (Auth.)

E-53153
Shen, Y.B., ed, **Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica** [Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu], State Antarctic Committee (Guojia Nanji kaocha weiyuanhui), Monograph, No.3, Beijing, Science Press (Kexue chubanshe), 1994, 348p. + plates, In Chinese with English summary on outside back cover. Refs. passim. For individual papers see B-53167, B-53169, and E-53154 through E-53166, E-53168 and E-53170.

This monograph covers stratigraphical and paleontological studies in Fildes Peninsula. Seventeen papers deal with subdivision and correlation of Late Cretaceous and Early Tertiary volcano-sedimentary rocks; a new Late Cretaceous lacustrine depositional unit; anatomy and taxonomy of fossil flora; organic geochemical characteristics of Tertiary coal; Late Cretaceous-Paleogene warm and humid palaeoclimatic environment which is related to tectonics and paleo-ocean current; and the terrestrial Weddellian Biogeographical Province and its significance in the reconstruction of Gondwana. 212 species within 109 genera (including 48 new species and 2 genera) are described, including such kinds of fossils as fungi, spore pollen, leaves, woods and bird ichnites, fresh-water diatoms, foraminiferas, bivalves and ostracods of recent surface sediments. Sixty-two plates are also included.

E-53154
Shen, Y.B., **Subdivision and correlation of Cretaceous to Paleogene volcano-sedimentary sequence from Fildes Peninsula, King George Island, Antarctica,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.1-36, In Chinese with English summary. 73 refs.

The Cretaceous to Paleogene strata and paleontology of Fildes Peninsula have been previously described in several reports, however no detailed analysis of the paleontology or depositional environments of the sequence as a whole has been published to date. The Fildes Peninsula Group is divided into five formations in ascending order: Half Three Point Formation, Jasper Hill Formation, Agate Beach Formation, Fossil Hill Formation and Block Hill Formation, ranging in age from Late Cretaceous to Early Miocene. The Suffied Point volcanic possibly represents latest volcanism in the Fildes Peninsula. Based on the palynomorph assemblage and isotopic data, the Half Three Point Formation has been assigned to Late Cretaceous (Campanian to Maastrichtian) in age. The early volcanic activity in the Fildes Peninsula took place in the Late Cretaceous rather than Paleocene. The evidence indicates that the Half Three Point Formation belongs to fresh-water lacustrine deposits. So far, this is the only locality found with Late Cretaceous terrestrial sediments in Antarctica. (Auth. mod.)

E-53155
Song, Z.C., Cao, L., **Late Cretaceous fungal spores from King George Island, Antarctica,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.37-49, In Chinese with English summary. 16 refs.

The fungal spores studied in this paper were collected from the volcanic-sedimentary rocks in the Upper Cretaceous Half Three Point Formation of the Fildes Peninsula. The rock series is of grey tuffaceous siltstone, attaining a thickness of about 5.5 m. From the occurrence of *Gleicheniidites* spp., *Clavifera* sp., *Asterisporites* sp., *Nothofagidites* spp. and *Cranwellia* sp., etc. in the same bed, the fungal spores are concluded to be of late Late Cretaceous age. About 38 fungal spores belonging to 13 genera and 16 new species are described. The new genus is *Cupulisporonites,* and the new species are: *Inapertisporites solidus, Lacrimasporonites scabratus, L. tenuous, Cupulisporonites megaporus, Dicellaesporites oblongatus, D. antarcticus, Dyadosporites obscurus, Brachysporisporites antarcticus, B. grandus, B. ovoidus, B. longovatus, Pluricelaes porites antarcticus, P. ocellatus, Diporicellaesporites antarcticus, D. stenosus* and *Involutisporonites? crassus.* (Auth. mod.)

E-53156
Cao, L., **Late Cretaceous palynoflora in King George Island of Antarctica with reference to its paleoclimatic significance,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.51-83, In Chinese with English summary. 52 refs.

Through sporopollen analysis of four samples collected from the volcanic sedimentary rocks of the Upper Cretaceous Half Three Point Formation in Fildes Peninsula, the following palynomorphs have been identified: a species of acritarch cyst, 38 species of fungal spores (including one new genus and 16 new species), 2 species of bryophyte spores, 21 genera and 40 species of fern spores (including 7 new species), 6 genera and 7 species of gymnosperm pollen, and 5 genera and 10 species of angiosperm pollen. Altogether, there are 98 species. Fern spores occupy 81.5% of the total number of the assemblage. Among them Gleicheniaceae, Cyatheaceae and Adiantaceae account for 28, 20.5 and 10.5% of the total respectively, thus these three families are the dominant groups of the assemblage. The sporopollen assemblage indicates that the climate of the time was warm and humid and the vegetation consisted mostly of ferns growing on a lake shore with a mixed forest of conifers, broad-leaved plants, and climbing lianas on nearby hillslopes. (Auth. mod.)

E-53157
Zhou, Z.Y., Li, H.M., **Some Late Cretaceous plants from King George Island, Antarctica,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.85-96, In Chinese with English summary. 26 refs.

From 1987 to 1988, plant fossils were collected from Half Three Point, at the southeast end of Fildes Peninsula, King George I. The plant-bearing beds attain a thickness of more than 5 m and consist of finely laminated grey tuffites, tuffaceous siltstones and sandstones intercalated with carbonaceous sediments. The beds are underlain by breccias and uncomformably overlain by volcanic rocks. Based on palynological studies, the Half Three Point beds are assigned to middle-late Late Cretaceous, and very possibly Campanian. The presence of *Podocarpus* and *Nothofagus* is of interest because the two genera have generally been regarded as the leading elements of Late Cretaceous to Early Tertiary floras of the Southern Hemisphere. At present, no other records are known of megafossils of *Nothofagus* in the Cretaceous. (Auth. mod.)

E-53158
Xue, Y.S., **Characteristics and sedimentary environment of volcanic debris rocks of Upper Cretaceous Half Three Point Formation from King George Island, Antarctica,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.97-108, In Chinese with English summary. 7 refs.

A suite of volcanic sedimentary rocks outcrops in a small island near the Half Three Point of Fildes Peninsula. Its lower part, of which most is below sea level, consists of volcanic breccia, and the upper part, about 5.5 m thick, consists of tuffites intercalated with thin-bedded tuffaceous mudstones, in which Late Cretaceous plant and sporopollen fossils have been found. The components of the tuffites include basaltic debris and plagioclase crystals, fine volcanic dusts and a small amount of quartz and illite. The laminated structure, normal graded beddings and intraformational normal faults are developed in the tuffite strata. (Auth. mod.)

E-53159
Wang, Y.X., Shen, Y.B., **Rb-Sr isotopic dating and trace element, REE geochemistry of Late Cretaceous volcanic rocks from King George Island, Antarctica,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.109-131, In Chinese with English summary. 31 refs.

Rb-Sr isotopic dating and trace element REE compositions of 12 samples from Half Three Point Formation were determined by the Center of Material Analysis, Nanjing University. The Rb-Sr isochron of the whole rock samples gives a value of 71.33 Ma as the crystalline age of the rocks or as the age of the volcanic eruption. The different geochemical features and the diagram to determine the structural environments in which the rock association is produced indicate that the volcanic rocks of the Upper Cretaceous Half Three Point Formation consist mainly of calc-alkaline basalts (CAB), with a few low-potassium tholeiites (island arc tholeiites). However, both the calc-alkaline basalts and the low-potassium tholeiites all belong to the volcanic arc basalts erupting from the convergent plate margin. Thus, it may be further determined that the structural environments there in which the Late Cretaceous volcanic magmas were produced are island arc volcanic active environments. Their materials were formed by the mantle-derived magmas during the island arc volcanic activity. (Auth. mod.)

E-53160
Li, H.M., **Early Tertiary Fossil Hill flora from Fildes Peninsula of King George Island, Antarctica,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.133-171, In Chinese with English summary. Refs. p. 160-164.

The Fossil Hill flora consists of more than 40 forms of ferns, gymnosperms and angiosperms, forming a mixture of subantarctic and neotropical elements, and mostly resembling Early Tertiary South American paleoflora. According to "the nearest living relative" method and leaf physiognomical analysis, the plants of the Fossil Hill flora probably grew under temperate to warm temperate climatic conditions. The mean annual temperature was probably 10-14°C; the mean annual range of temperature could be low; and the precipitation was abundant. The area where the plants were growing was at rather low altitudes. The Fossil Hill flora is most likely Early to Middle Eocene in age, which is nearly coincident with the isotopic age of the Fossil Hill Formation and the Block Hill Formation, i.e. 52-43 Ma. (Auth. mod.)

E-53161
Zhou, Z.Y., Li, H.M., **Early Tertiary ferns from Fildes Peninsula, King George Island, Antarctica,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.173-189, In Chinese with English summary. 23 refs.

Fossil ferns from the Tertiary of Antarctica were reported in 1908 and subsequently in 1981 and 1986, but most are small segments of sterile pinnae often difficult to identify even at the family level. In recent years (1986-1988), Tertiary plants were collected by the Chinese Antarctic Expeditions from Fossil Hill, Fildes Peninsula. The material includes 8 different forms of ferns. Amongst them, two *(Gleichenia* sp. and *Thyrsopteris shenii* sp. nov.) are well preserved so as to exhibit either the architecture of the frond or the structure of fertile pinnae with sori and spores intact. It is therefore possible to identify them and to evaluate the occurrence and distribution of ferns in the Tertiary of Antarctica on the basis of morphological details for the first time. (Auth. mod.)

E-53162
Zhou, Z.Y., Li, H.M., **Early Tertiary gymnosperms from Fildes Peninsula, King George Island, Antarctica,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.191-221, In Chinese with English summary. 66 refs.

During the years 1986-1988, the Chinese Antarctic Expeditions made a large collection of fossil plants from King George I. The bulk of the specimens were collected from the Early Tertiary (Eocene) Fossil Hill Formation in Fossil Hill, Fildes Peninsula. The Fossil Hill flora consists mainly of angiosperms as other Tertiary floras usually do. In the present material, gymnosperms are only represented by isolated and small fragments of shoots markedly in contrast with the well-preserved and abundant angiospermous leaves. However, more than 10 taxa have been detected which constitute by far the most diversified collection of gymnosperms hitherto known from the Tertiary of King George I. A systematic study of the material is, therefore, of major significance in understanding the past distribution of the gymnospermous group and the composition of the Early Tertiary vegetation as a whole in Antarctica. (Auth. mod.)

E-53163
Zhang, S.Z., Wang, Q.Z., **Paleocene petrified wood on the west side of Collins Glacier in the King George Island, Antarctica,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.223-238, In Chinese with English summary. 20 refs.

The present specimens were scattered in the andesitic lava of the Paleocene Agate Beach and are well preserved, with microscopic structures being visible in the section. These have been recognized as *Podocarpoxylon fildesense* sp. nov., a gymnospermous plant, and *Caldcluvioxylon collinsese* sp. nov., an angiospermous plant. In character, their secondary xylems are all perfect in development, stems thick and bulky, growth rings distinct, having a high average annual growth rate. These plants were located in the central part of the forest rather than on the marginal forest area. Thus it can be seen that during the Paleocene in the Antarctic Peninsula, it was considerably warmer than now and there existed dense forest in the area along what is now the Collins Glacier. (Auth. mod.)

E-53164

Li, J.J., Zhen, S.N., **New materials of bird ichnites from Fildes Peninsula, King George Island of Antarctica and their biogeographic significance,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen., Beijing, Science Press (Kexue chubanshe), 1994, p.239-249, In Chinese with English summary. 6 refs.

Five bird footprint fossils collected in 1988 from the Eocene Fossil Hill Formation, Fildes Peninsula are described and compared with four kinds of bird footprints found previously in the same locality, including the footprints of large ground birds with broad toes (maximum print length, 18 cm), probably either a ratite or a gruiform, and probably large or small gooselike birds (maximum print length, 8.6 cm) with three relatively broad, moderately elongate webbed digits. The third morphotype has four elongate, slender, unwebbed digits, usually 10.26 cm length. The fourth morphotype is similar to the third but much smaller, only 2.9 cm long, which was thought to belong to a bird of the family Rallidae and was named *Antarctichnus fuenzalidae.* Three of the five ichnites described here are assigned to *A. fuenzalidae.* Among these three footprints, two form a pace 3.9 cm long. Two of the five ichnites are a new type, *Fildesichnus sheni* ichnogen. et sp. nov. (Auth. mod.)

E-53165

Li, X.Y., Shen, Y.B., **Preliminary study on the genesis of Tertiary coal from Fildes Peninsula of King George Island, Antarctica, based on petrographical, chemical and organic geochemical characteristics,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.251-261, In Chinese with English summary. 10 refs.

The coal samples under study were collected by the Fourth Chinese Antarctic Expedition (1987-88) from the volcanic sedimentary rocks of the Eocene Fossil Hill Formation in the Fildes Peninsula. Through petrographical, coal chemical and organic geochemical studies, the parent coal type and the coal rank are determined, and the genesis of the coal is also discussed. The coal under study is composed of vitrain, being of bright type. The macerals are of vitrinite, mainly telocollinite. According to the classification of bituminous coal, the coal is determined to be flame coal. Stratigraphically, volcanic rocks are overlain by coal beds of about 6-7 cm in thickness. It is thought that the coal seam was formed as flood deposits between volcanic activities. Because of intermittent volcanic activities, strong crust activities and geothermal action, the coal was formed in a short time; the coal seam was thin and discontinuous horizontally and matured into bituminous coal of low rank by increasing stratigraphic temperature. (Auth. mod.)

E-53166

Yang, J.R., Shen, Y.B., **Preliminary study on freshwater diatom flora from King George Island, Antarctica,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.263-287, In Chinese with English summary. 34 refs.

Sediment samples were collected from shallow freshwater areas, such as pond, stream and other waterlogged places on King George I. during the austral summer from Dec. 1987 to Feb. 1988. The dominant species in diatom composition of King George I. were comprised of *Fragilaria construens* var. *binodis* Grunow, *F. capicina* Desm., *Navicula mutica* Kützing, *N. mutica* var. *cohnii* Grunow, *N. muticopsis* Van Heurck, *Pinnularia antarctica* sp. nov., *P. microstauron* Cleve, *Nitzschia frustulum* var. *subsalina* Hustedt and *Gomphonema lanceolatum* var. *insignis* Cleve. The most common species (5% of total) in sample composition were *Achnanthes marginulata* Grunow, *A. brevips* Agardh, *A. brevips* var. *intermedia* Cleve, and *Pinnularia borealis* Ehrenberg. Three new diatom species, *Pseudoeunotia antarctica* Yang sp. nov., *Stauroneis antarctica* Yang sp. nov. and *Pinnularia antarctica* Yang sp. nov., were discovered. The freshwater diatom assemblage from King George I. has the characteristic features of low species richness, low species diversity and a high population. Benthic pennate species are dominant. These features are also common in recent diatom assemblages in arctic lakes and in fossil diatom assemblages formed in the late-glacial period. (Auth. mod.)

E-53168

Lan, X., **Some marine bivalves from the Great Wall Bay of King George Island, Antarctica, and their geographical distribution,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.309-318, In Chinese with English summary. 12 refs.

Fossil bivalves were collected from the marine Late Holocene and the Recent deposits in the Great Wall Bay of King George I. during the austral summer of 1987-88. They contain 2 species belonging to 2 genera, i.e. *Laternula elliptica* (King et Broderip) from the Late Holocene and *Yoldia (Aeqviyoldia) eightsi* (Couthouy) from the Recent deposits. *Laternual elliptia* (King et Broderip) is a large-sized species of semi-infaunal bivalve. It lives on different bottoms, for example, clay, gravel or seaweed. This species was taken from a depth of less than 321 m, and was found in the circum-antarctic regions, i.e., South Shetland Is., South Orkneys Is., South Sandwich Is., South Georgia Is., Kerguelen Is., and Vestfold Hills. The other species *Y. (A.) eightsi* (Couthouy) is also a semi-infaunal bivalve, living on bottoms of mud, sand or stones. It ranges from 5-728 m and is limited to the South Shetlands, South Orkneys, South Georgia, Falklands and the Magellan Strait. (Auth. mod.)

E-53170

Shen, Y.B., **Cretaceous and Paleogene biogeography in Antarctic Peninsula and its significance in the reconstruction of Gondwanaland,** Nanji Qiaozhi Wang Dao Feierdesi Bandao diceng ji gushengwu yanjiu (Stratigraphy and palaeontology of Fildes Peninsula, King George Island, Antarctica). Edited by Y.B. Shen, Beijing, Science Press (Kexue chubanshe), 1994, p.329-348, In Chinese with English summary. 56 refs.

Antarctica is critical to understanding the biological and geological evolution of the Southern Hemisphere. In particular the several tectonic components of West Antarctica are important for clarifying relationships among the southern Pacific land masses. *Nothofagus* has been considered a "key" genus in plant biogeography of the Southern Hemisphere. Species of the genus are currently distributed in southern South America, New Zealand, and in Australia and associated islands (e.g. New Guinea and New Caledonia). A lot of fossil *Nothofagus* have been found in Antarctica, particularly in the Antarctic Peninsula. Modern species of *Nothofagus* are known to have a very restricted overland seed dispersal (less than 1 km). Up to now the earliest records of fossil *Nothofagus* were reported from the Upper Cretaceous, probably in Campanian stage. There are no *Nothofagus* in Africa and India, either fossil species or extant forms, since the African and Indian blocks were separated from Antarctica before *Nothofagus* appeared. Eocene fossils suggest that marsupials entered the Antarctic Peninsula from South America about 55 or 60 Ma, roughly equivalent to the time of final separation of Australia from mainland Antarctica. (Auth. mod.)

E-53172

Cooper, A.K., Webb, P., Brancolini, G., **Strides made in understanding antarctic stratigraphy and Cenozoic glacial history,** *EOS,* Mar. 7, 1995, 76(10), p.97, 101.

In Aug. 1994, a symposium in Siena, Italy was held to examine results of the ANTOSTRAT studies within five broad segments of the antarctic margin: Wilkes Land, Prydz Bay, Weddell Sea, Antarctic Peninsula, and Ross Sea. The 85 participants debated important thematic issues of Cenozoic glacial history and evolution of the vast offshore sedimentary records and developed strategies for future antarctic drilling and coring. The focal areas include, among others, conflicting antarctic glacial histories; the influence of the grounded ice sheet; the roles of climate factors and local tectonics; and extending previous work in areas of extensive data availability.

E-53189

Torres, T., Philippe, M., Galleguillos, H., Hauch, F., **New discoveries of plant fossils on Snow I.** [Nuevos descubrimientos de restos vegetales en la isla Snow, Shetland del Sur, Antártica], *Boletín Antártico Chileno,* May 1995, 14(1), p.25-28, In Spanish. 6 refs.

New fossil plants discovered at several sites on Snow I. in 1994 are discussed. The fossil flora is found to be well preserved, rich in variety and representative of the Mesozoic period. The taxonomic composition of the fossils is given, and paleogeographic and paleoclimatological implications are examined, with the conclusion that the findings provide solid evidence of paleofloristic similarities between South America and Antarctica.

E-53213

Van der Wateren, D., Hindmarsh, R., **Stabilists strike again,** *Nature,* Aug. 3, 1995, 376(6539), p.389-391, 15 refs.

A long-enduring debate is renewed by this response to another article in the same issue of *Nature*. Opposing views hinge on the question: was East Antarctica ice free during the Pliocene or was ice buried under a sediment layer at that time? Is there a right or wrong here or is there, perhaps, one or more other alternatives? So far it would seem that, in spite of good will on both sides as they meet to discuss the problem, there is as yet insufficient evidence to make a definitive interpretation either way.

E-53214

Sugden, D.E., et al, **Preservation of Miocene glacier ice in Antarctica,** *Nature,* Aug. 3, 1995, 376(6539), p.412-414, 24 refs.

Antarctic climate during the Pliocene has been the subject of considerable debate. One view holds that, during part of the Pliocene, East Antarctica was largely free of glacier ice and that vegetation survived on the coastal mountains. An alternative viewpoint argues for the development of a stable polar ice sheet by the middle Miocene, which has persisted since then. Reported here is the discovery of buried glacier ice in Beacon Valley, East Antarctica. The ice is dated by ^{40}Ar/^{39}Ar analysis of volcanic ash in the thin overlying glacial till which, it is argued, has undergone little (if any) reworking. Isotope and crystal fabric analyses of the ice show that it was derived from an ice sheet. It is suggested that stable polar conditions must have persisted in this region for at least 8.1 m.y. for this ice to have avoided sublimation. (Auth. mod.)

E-53216

Jojo, P.J., Kumar, A., Ramachandran, T.V., Prasad, R., **Microanalysis of uranium in Antarctica soil samples using fission track method,** *Journal of radioanalytical and nuclear chemistry,* Apr. 1995, 191(2), p.381-386, 10 refs.

Soil samples collected at the Indian Maitree Station and belonging to the east antarctic charnockite provinces have been analyzed to determine trace uranium concentrations. The fission track technique using Makrofol-KG as the track detector was used for the analyses. Finely powdered samples and pellets were irradiated with thermal neutrons from a nuclear reactor. Uranium concentrations were obtained from the tracks of the detector. Uranium concentrations varied from 0.036 to 0.364 ppm in the samples investigated. The low levels of uranium indicate the absence of human intervention with the lithosphere in this region. (Auth.)

E-53218

Beckerling, W., Bischoff, A., **Occurrence and composition of relict minerals in micrometeorites from Greenland and Antarctica: implications for their origins,** *Planetary and space science,* Mar./Apr. 1995, 43(3-4), p.435-449, Refs. p.447-449.

The mineralogy and chemistry of 161 micrometeorites from Greenland (100-200 μm) and 66 micrometeorites from Antarctica (50-100 μm) were studied in order to obtain information about their origin. Within 66 of these 227 particles, 140 relict olivines and 84 relict pyroxenes were found. In addition, other relict minerals were identified, including perovskite, chromite, Fe, Ni-metal, magnetite and sulfides. The textures of micrometeorites showing relict minerals range from fine-grained porous particles to spherical particles; a close relationship of most of the particles to various types of carbonaceous chondrites is suggested. Since the majority of asteroids appear to consist of materials related to carbonaceous chondrites, the authors conclude that, statistically, micrometeorites with relict grains in the studied size range of 50-200 μm represent much better the abundance of distinct types of asteroids than the abundance of distinct groups of meteorites as revealed by the statistics of modern falls. (Auth. mod.)

E-53219

Herpers, U., et al, **Cosmogenic nuclides in differentiated antarctic meteorites: measurements and model calculations,** *Planetary and space science,* Mar./Apr. 1995, 43(3-4), p.545-556, Refs. p.555-556.

The cosmogenic radionuclides ^{10}Be, ^{26}Al and ^{53}Mn and stable He-, Ne- and Ar-isotopes were measured in differentiated meteorites from Antarctica using accelerator mass spectrometry, γ-γ-coincidence techniques, radiochemical neutron activation analysis and conventional mass spectrometry. No depth effects were seen in meteorites from which several samples were analyzed. In most of the meteorites ^{10}Be and ^{26}Al were in saturation at time of fall, but the ^{26}Al concentrations are partially lowered by substantial terrestrial ages. For ^{10}Be some extremely low concentrations were found which cannot be explained by the decay during terrestrial residence. The experimental data are discussed together with rare-gas measurements in the context of model calculations of the depth- and size-dependent production of cosmogenic nuclides in differentiated stony meteorites. Based on the model calculations, minimal exposure ages, ^{21}Ne/^{53}Mn and shielding-corrected ^{21}Ne exposure ages were calculated. A detailed discussion of the production rates and of possible pairing of meteorites is given. (Auth.)

E-53220

Hensen, B.J., Zhou, B., **Pan-African granulite facies metamorphic episode in Prydz Bay, Antarctica: evidence from Sm-Nd garnet dating,** *Australian journal of earth sciences,* June 1995, 42(3), p.249-258, Refs. p.257-258.

The granulite facies gneisses along the Prydz Bay coastline have long been regarded as part of an extensive Proterozoic (ca. 1000 Ma) terrane, based on correlations with other parts of eastern Antarctica. New Sm-Nd garnet-whole rock dates for various rocks indicate that the main metamorphic episode that has affected the rocks in Prydz Bay is of Pan-African age (515-490 Ma). Only in the western part of the area have older garnet ages been found. On Søstrene I., where petrographic and analytical work suggest an earlier higher pressure metamorphic event, an age of 990 Ma correlates with some well-established metamorphic ages from the Northern Prince Charles Mountains to the south, the Rayner Complex, Enderby Land to the southwest and part of the Rauer Group to the east. (Auth. mod.)

E-53221

Worley, B.A., Cooper, A.F., **Mineralogy of the Dismal Nepheline Syenite, southern Victoria Land, Antarctica,** *Lithos,* Apr. 1995, 35(1-2), p.109-128, Refs. p.127-128.

The mineralogy of the Dismal Nepheline Syenite indicates crystallization from a pulse of chemically evolved, anhydrous, alkaline magma concordantly intruded into Koettlitz Group metasediments. In the main intrusion, orthomagmatic phases exhibit only minor mineralogical variation with typical compositions being hedenbergite, nepheline, alkali-feldspar and carbonate. The Fe^{2+}-rich nature of the hedenbergite indicates that the orthomagmatic assemblage formed under low f_{O_2} conditions as a result of internal buffering of the oxygen and CO_2 fugacities during crystallization by the graphite-CO_2 equilibrium. Subsolidus coronas composed of hastingsite + andradite-rich garnet formed at the expense of hedenbergite and nepheline. This corona assemblage indicates an increase in the f_{H_2O} and relative f_{O_2} of the system, as a result of gradual equilibrium with hydrous fluids from the surrounding Koettlitz Group metasediments. (Auth. mod.)

E-53222

Worley, B.A., Cooper, A.F., Hall, C.E., **Petrogenesis of carbonate-bearing nepheline syenites and carbonatites from southern Victoria Land, Antarctica: origin of carbon and the effects of calcite-graphite equilibrium,** *Lithos,* June 1995, 35(3-4), p.183-199, 29 refs.

Chemically-evolved carbonate-bearing nepheline syenites are intruded into basement metasediments of the Koettlitz Group on Dismal and Radian Ridges, southern Victoria Land. Whole rock XRF data from the Dismal Nepheline Syenite defines a broad trend which is consistent with the removal of a cumulate fraction of approximate composition 70% hedenbergite, 15% nepheline, 10% titanite and 5% apatite. Stable isotope, major and trace element and mineralogical characteristics of the syenites are very similar to those of cross-cutting calcite-rich dykes, indicating derivation from closely-related source magmas. The general association of carbonatites and nepheline syenites with extensional environments suggests that the Dismal and Radian Ridge nepheline syenites and carbonatite dykes indicate a period of early Paleozoic (531 ma) rifting or intrusion into localized tensional structures in an overall compressional regime. (Auth. mod.)

E-53223

Borsi, L., Petrini, R., Talarico, F., Palmeri, R., **Geochemistry and Sr-Nd isotopes of amphibolite dykes of northern Victoria Land, Antarctica,** *Lithos,* June 1995, 35(3-4), p.245-259, Refs. p.257-259.

Mafic dykes cutting the gneisses and migmatites in the Deep Freeze Range high-grade metamorphic complex of northern Victoria Land have undergone strong recrystallization and deformation during amphibolite-facies metamorphism. Metamorphic mobility mostly affected the large-ion lithophile elements (LILE). Rare Earth (RE) and high field-strength elements (HFSE) were essentially immobile during metamorphism. Together with the major-element geochemistry, this suggests primary characteristics of evolved tholeiitic magmas and mafic cumulates. No precise ages of intrusion are available for the dykes, but geological evidence suggests emplacement during the time interval 800 to 900 Ma. The Rb-Sr isotopic systems in some of the dykes were also variably affected by a later thermal event, probably coincident with the time of amphibolite metamorphism, ca. 500-550 Ma. This event can be correlated with the Ross Orogeny in the Transantarctic Mountains. (Auth. mod.)

E-53230

Harley, S.L., Christy, A.G., **Titanium-bearing sapphirine in a partially melted aluminous granulite xenolith, Vestfold Hills, Antarctica: geological and mineralogical implications,** *European journal of mineralogy,* May, June 1995, 7(3), p.637-653, Refs. p.651-653.

A new compositional variety of sapphirine, containing up to 1.5 wt% TiO_2 and close to the synthetic $2MgO{:}2Al_2O_3{:}SiO_2$ (2:2:1) end-member, has been formed through partial melting of an aluminous and magnesian sapphirine-enstatite-spinel granulite xenolith entrained in a noritic intrusive in the northern Vestfold Hills. This sapphirine is 1Tc polytype and preserves internal twinning and stacking faults similar to other high-temperature sapphirines. The 2:2:1 sapphirine occurs in feldspathic areas and stringers throughout the xenolith and formed at temperatures in the range 1100-1180°C. Phase relations involving sapphirine, enstatite, spinel and cordierite constrain the pressure of contact melting, and therefore the emplacement depths of the ca. 2240 Ma post-metamorphic norite, to be near 3.5 kbar (8-11 km). The Vestfold Hills underwent substantial uplift following the ca. 7-8 kbar late-Archaean (ca. 2500-2480 Ma) metamorphism, rather than experiencing prolonged deep-crustal burial and slow exhumation. (Auth.)

E-53235

Johnson, A.C., **Airborne geophysics in West Antarctica,** International Airborne Remote Sensing Conference and Exhibition, 1st, Strasbourg, France, Sep 12-15, 1994. Proceedings, Vol.3. Applications, technology and science, Ann Arbor, Environmental Research Institute of Michigan, 1994, p.III-524-III-528, 16 refs.

DLC G70.39.I55a

The British Antarctic Survey has carried out aeromagnetic surveys over West Antarctica since 1973. Up to 1987, work concentrated on providing regional coverage at a line spacing of 15-20 km, using a single proton-precession magnetometer mounted on a Twin Otter aircraft. These data have been compiled into an aeromagnetic anomaly map of West Antarctica (Weddell Sea sector). The map is based on a 6 km minimum curvature grid which has been contoured at 50 nT intervals. This is sufficient to enable interpretation of large-scale crustal features. (Auth. mod.)

E-53239

Canfield, D.E., Green, W.J., Nixon, P., **^{210}Pb and stable lead through the redox transition zone of an antarctic lake,** *Geochimica et cosmochimica acta,* June 1995, 59(12), p.2459-2468, 59 refs.

In Lake Vanda, relatively low Eh values combined with a lowering of pH lead to the dissolution of manganese oxides, and the accumulation of dissolved Mn. This paper presents the depth distributions of dissolved and particulate stable lead, ^{210}Pb, and ^{226}Ra, to understand the dynamics of lead cycling through the redox transition zone. Results indicate that stable lead is released from dissolving manganese oxides in the region between 51 to 61 m, resulting in a dissolved lead maximum at 59 m. Concentration profiles show that dissolved lead diffuses to the top of the zone of aerobic Mn reduction (AMR) and is sequestered onto newly formed manganese oxides. These oxides settle and dissolve, releasing lead back to solution. Lead also diffuses downward into the anoxic-sulfidic waters for permanent removal as insoluble PbS phases. Model calculations demonstrate that scavenging onto particles is the most important removal pathway for stable lead from the AMR zone. Finally, similar timescales of removal are found for ^{210}Pb and stable lead, showing that in this environment, the ^{210}Pb "clock" may be applied to understanding rates of stable lead cycling. (Auth. mod.)

E-53243

Khandekar, R.N., Tripathi, R.M., Raghunath, R., Sathe, A.P., Nambi, K.S.V., **Heavy metal concentrations in air, water and rock samples at Antarctica during 1989-1990,** *Current science,* Aug. 25, 1992, 63(4), p.201-204, 15 refs.

Concentrations of lead, cadmium, zinc and copper have been measured in air particulates and seawater samples collected enroute to Antarctica and at the Indian station Maitri for the period Dec. 1989 to Feb. 1990 during the IX Indian Expedition. The analysis was carried out using the technique of differential pulse anodic stripping voltammetry (DPASV). Atmospheric concentrations as well as seawater concentrations showed a decreasing trend towards Antarctica except near Mauritius I. The atmospheric concentrations of lead at different locations at Maitri varied between 0.23 and 0.41 ng/m^3 and that of copper varied between 0.4 and 1.7 ng/m^3. Levels of lead, cadmium, copper and zinc were also measured in different types of rock samples collected around Maitri Station. Some of these findings are briefly discussed here. (Auth.)

E-53247

DaSilva, J.L., **Seismic facies investigation and Late Quaternary glacial history of the Chilean shelf and fjords and Antarctic Peninsula fjords,** Houston, Rice University, 1995, 273p., M.A. thesis. Refs. p.166-200.

High-resolution seismic data collected in inland waters of Chile and the Antarctic Peninsula were interpreted using seismic facies analysis. Piston cores provide some lithologic control on the interpretation of the seismic data. These data span a latitudinal transect that encompasses temperate, subpolar and polar climatic regimes, and these regimes are characterized by differences in seismic facies. In the present climatic regime, northern and central Chile fall into a temperate climate regime and the Antarctic Peninsula falls into a subpolar/polar climate regime. A sub-temperate facies transition encompasses the South Shetland Is. and southern Chilean fjord region. The data were used to compile maps that show seismic facies distribution patterns. These maps are the basis for glacial reconstructions that span the present interglacial to the Last Glacial Maximum (LGM). The maps show the extent of northward shift in climatic settings during the Last Glacial Maximum. (Auth.)

E-53253

Hill, R.S., Scriven, L.J., **Angiosperm-dominated woody vegetation of Antarctica: a review,** *Review of palaeobotany and palynology,* June 1995, 86(3/4), p.175-198, Refs. p.195-198.

Antarctic vegetation is today mostly restricted to non-vascular plants, with a few small angiosperms clinging to the Antarctic Peninsula. However, probably as recently as the mid-Late Pliocene, woody angiosperms were present in inland Antarctica, suggesting an overall presence of complex and diverse vegetation. Angiosperms were introduced into Antarctica during the Cretaceous from South America and possibly also Southeast Asia via Australia. These angiosperms speciated rapidly at the prevailing high latitudes and were an important source for the developing angiosperm-dominated vegetation of the Southern Hemisphere. The migration and evolution of early angiosperms in Gondwana was probably facilitated by a high level of disturbance caused primarily by the rifting of the supercontinent. This high-latitude region was an important source of evolutionary novelty during the Late Cretaceous-Paleogene. As the climate deteriorated during the Cenozoic, the angiosperm flora was reduced in biomass and diversity, finally being restricted to the current remnants. The timing and nature of this major regional extinction is still poorly understood. (Auth.)

E-53265

Marshall, J.D., Ditchfield, P.W., Pirrie, D., **Stable isotope palaeotemperatures and the evolution of high palaeolatitude climate in the Cretaceous,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.71-79, Refs. p.78-79.

Representative material from macro-fossil groups thought to precipitate carbonate close to isotopic equilibrium with seawater, from most of the major stratigraphic units in the Tithonian (Upper Jurassic) to Eocene sequence from the James Ross I. area, have been analyzed petrographically and geochemically. The faunas show a wide range of diagenetic alteration. The general trends in the stable isotopic results are tentatively interpreted as indicating cool, temperate, high latitude paleotemperatures throughout the Cretaceous. Two discrete episodes of cooling are indicated with an intervening warmer episode apparent in the early part of the Late Cretaceous. (Auth. mod.)

E-53270

Shimmield, G.B., Derrick, S., Pudsey, C., Barker, P., Mackensen, A., Grobe, H., **Use of inorganic chemistry in studying the palaeoceanography of the Weddell Sea,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.99-108, Refs. p.107-108.

Changes in biological productivity over glacial to interglacial episodes within the world's oceans have been suggested to have a major impact on changes in atmospheric CO_2 content as recorded in long ice cores. In the last few years several studies have been undertaken in the southern ocean to validate this "glacial productivity hypothesis". These studies, and the work presented here, now demonstrate clearly that glacial productivity was lower south of the present-day Antarctic Polar Front. In order to establish palaeoceanographic and palaeoproductivity records for the Weddell Sea where an absence of foraminifera precludes the standard use of $\delta^{18}O$ stratigraphy and ^{14}C-dating, the authors have developed a method based on the synchronous removal of barium to the ocean floor by scavenging and formation of barite within the frustules of marine diatoms. Results show that the highest palaeoproductivity occurs in the vicinity of the Scotia Arc and decreases southwards due to increased seasonal sea ice cover. Increased Ti/Al ratios, a proxy of bottom water velocities, suggest increased flow of Antarctic Bottom Water during interglacial episodes. (Auth. mod.)

E-53282

Saito, K., **Excess Ar in some metamorphic and plutonic rocks and reduction of thermal neutron-induced ^{40}Ar by Cd shielding,** *Tohoku University. Research Institutes. Science reports. Series A,* July 1994, 40(1), Irradiation effects on nuclear materials, p.185-189, 11 refs.

It is well known that in K-Ar dating, a reliable age cannot be obtained from a sample containing excess Ar. The $^{40}Ar/^{39}Ar$ method has, potentially, the ability to provide geologically meaningful ages even for such samples with excess Ar. A Mawson charnockite from Antarctica is a good example. In $^{40}Ar/^{39}Ar$ dating, thermal neutron induced ^{40}Ar from 40K is one of the major sources of errors in age calculations. Wrapping a sample with Cd foil is very effective in reducing this disturbing ^{40}Ar. (Auth. mod.)

E-53283

Kaneoka, I., Takigami, Y., **^{40}Ar-^{39}Ar dating of terrestrial and extraterrestrial materials: basalts from the Japan Sea floor, Deccan Plateau and meteorites from Antarctica,** *Tohoku University. Research Institutes. Science reports. Series A.,* July 1994, 40(1), Irradiation effects on nuclear materials, p.191-195, 13 refs.

Through a series of $^{40}Ar/^{39}Ar$ dating for terrestrial and extraterrestrial samples, the results for basalts from the Japan Sea floor, Deccan Plateau and for meteorites from Antarctica give significant information concerning their formation histories. Ages of basalts from the Japan Sea floor give a constraint that the Japan Sea floor was formed at least 20 Ma. Ages for dyke samples from the Deccan Plateau indicate a possibility for the occurrence of somewhat younger ages than those of the main plateau formations by a few million years. Meteorites collected from Antarctica show some variable ages reflecting their different thermal histories. (Auth. mod.)

E-53287

Ten Brink, U.S., Schneider, C., **Glacial morphology and depositional sequences of the antarctic continental shelf,** *Geology,* July 1995, 23(7), p.580-584, 17 refs.

A simple model for the unusual depositional sequences and morphology of the antarctic continental shelf is proposed. The model considers the regional stratal geometry and the reversed morphology of the antarctic continental shelf to be principally the results of time-integrated effects of glacial erosion and sedimentation related to the location of the ice grounding line. The model offers several guidelines for stratigraphic interpretation of the antarctic shelf and a Northern Hemisphere shelf, both of which have been subject to many glacial advances and retreats. (Auth. mod.)

E-53290

Guilcher, A., Bodéré, J.C., Coudé, A., Hansom, J.D., Moign, A., Peulvast, J.P., **Strandflat problem in five high latitude countries,** Cold climate landforms. Edited by D.J.A. Evans, Chichester, England, John Wiley & Sons Ltd., 1994, p.351-393, Translated from Revue de Géologie Dynamique et de Géographie Physique, Vol.27, 1986, p.47-79.

The problem of strandflat development is reexamined in western Spitsbergen, northern Norway (Lofoten-Vesterålen Is.), Iceland, western Ireland, and South Shetland Is. (Antarctica). In western Spitsbergen and in the South Shetlands, coastal erosion related to typical periglacial processes is presently in progress. In the South Shetlands, coastal platforms result principally from frost-shattering of cliffs and/or floating ice erosion. However, the present platforms in the South Shetlands have been prepared during previous sea levels related to (Wisconsin?) glaciation. The coasts of the South Shetland Is. include large platforms of the strandflat type. They occur at several levels, but the best ones are between 0 and 17 m above present sea level. According to several scientists, they are related to marine abrasion processes. Raised beaches and residual skerries, associated with a topography of emerged platform, closely resemble the present-day platform and shoreline. In the South Shetlands, the coastal platforms are mainly shaped by marine glacial processes in places where mechanical action of waves is minor. Gelifraction cliffs and platforms and rafting by floating ice are erosion processes which act efficiently and, according to site, at a rate evaluated between 0.17 and 2.30 m per year. (Auth. mod.)

E-53310

Franklin, D.C., Marchant, H.J., **Parmales in sediments of Prydz Bay, East Antarctica: a new biofacies and paleoenvironmental indicator of cold water deposition?,** *Micropaleontology,* 1995, 41(1), p.89-94, 28 refs.

Siliceous wall plates of two species of Parmales are present in varying abundance in the surficial and downcore sediments of Prydz Bay. These organisms have a dramatically higher abundance and greater species diversity in polar and sub-polar environments than is seen in temperate and tropical waters. Based on findings of abundant and well-preserved walls of these organisms in antarctic sediments, it is suggested that they represent a useful biofacies and paleoenvironmental marker for deposition from cold water, and a potentially new biostratigraphic tool. (Auth. mod.)

E-53312

Pavlishina, P., Pimpirev, Ch., **Palynological evidence of Tertiary age on the Miers Bluff Formation, Livingston Island, Antarctica,** *Académie bulgare des Sciences. Comptes rendus,* 1994, 47(8), p.85-88, 13 refs.

During the Second Bulgarian Antarctic Expedition in 1993-94 in Hurd Peninsula, Livingston I., detailed stratigraphic sections and palynological sampling at the turbidite sequences were made. Eleven samples originating from 6 different sections have yielded varied palynofloras, suggesting Tertiary age for the sediments. This paper includes the description of the stratigraphic section in the Monte Charrua Ridge and the Tertiary palynomorph assemblage found in the same section. (Auth. mod.)

E-53321

Weaver, S.D., Storey, B.C., Pankhurst, R.J., Mukasa, S.B., DiVenere, V.J., Bradshaw, J.D., **Antarctica-New Zealand rifting and Marie Byrd Land lithospheric magmatism linked to ridge subduction and mantle plume activity,** *Geology,* Sep. 1994, 22(9), p.811-814, 24 refs.

Mid-Cretaceous igneous rocks of central Marie Byrd Land record a rapid change from subduction-related to rift-related magmatism. This correlates with the final stages of subduction of the Phoenix plate and the subsequent rifting of New Zealand from West Antarctica, prior to the opening of the southern ocean. Rift magmatism produced diverse A-type granitoids and mafic intrusive rocks of continental flood-basalt affinity that were derived ultimately from lithospheric mantle sources. Rifting was caused by changes in plate boundary forces; however, mantle plume activity may have begun in mid-Cretaceous time, triggering melting of the lithosphere and controlling the locus of rifting. (Auth.)

E-53332

Yanai, K., ed, NIPR Symposium on Antarctic Meteorites, 19th, Tokyo, May 30-June 1, 1994, **Proceedings of the NIPR Symposium on Antarctic Meteorites, No.8,** Tokyo, National Institute of Polar Research, 1995, 363p., Refs. passim. For selected papers see E-53333 through E-53344.

Thirteen scientific papers, among 69 presented at the symposium, are submitted in this volume of the proceedings, covering such subjects as classification of meteorites, petrology, mineralogy, chemical studies, isotope studies and physical studies on antarctic and non-antarctic meteorites and cosmic dust.

E-53333

Yanai, K., Kojima, H., **Yamato-8451: a newly identified pyroxene-bearing pallasite,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.8, Tokyo, National Institute of Polar Research, 1995, p.1-10, 6 refs.

Yamato-8451 is an unusual meteorite from the Queen Fabiola Mts. which is newly identified as a pyroxene-bearing pallasite. It consists mainly of Fe-Ni metal, olivine and pyroxene, and shows a porphyritic texture typical of most olivine, the same texture as that of all known pallasite meteorites. Yamato-8451 might have been classified as one of the common pallasites because of its exotic texture and mineral assemblage, a unique feature of pallasites, but it is highly unusual because it contains pyroxene. Most olivine and pyroxene crystals are well rounded to subrounded, but angular grains and grain aggregates are also recognized in the metallic host. Pyroxenes are mm-sized and consist of three different types in Ca content: exceptionally Ca-poor polysynthetic twinned orthopyroxene (under Wo 1.0); Ca-poor non-polysynthetic twinned orthpyroxene (Wo 1.0-3.5); and clinopyroxene (over Wo 40). The olivine composition is Fo 89.6 on average, the most magnesian known in all pallasites. (Auth.)

E-53334

Weisberg, M.K., Prinz, M., Clayton, R.N., Mayeda, T.K., Grady, M.M., Pillinger, C.T., **CR chondrite clan,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.8, Tokyo, National Institute of Polar Research, 1995, p.11-32, Refs. p.29-32.

The CR chondrites LEW 85332 Acfer 182, ALH 85085-like chondrites, and Bencubbin-like chondritic breccias are five kinds of chondritic groups which have dramatically different petrographic characteristics, but have mineralogical, bulk chemical, and oxygen and nitrogen isotopic similarities that indicate they are closely related. They are all considered to be members of the CR chondrite clan. Distinguishing characteristics of CR clan chondrites include: reduced Mg-rich mafic silicates; hydrous matrix and/or dark inclusions (except for Bencubbin-like chondrites); high modal abundances of FeNi metal; FeNi metal having a solar Ni:Co ratio; solar (CI) abundances of refractory and moderately volatile lithophiles, and highly depleted abundances of volatile lithophiles; similar oxygen isotopic compositions of whole rocks, chondrules and matrices, which are on or near the CR mixing line; and anomalously high ^{15}N abundances. CR clan chondrites must have formed in the same local region of the nebula, from closely related reservoirs of materials. (Auth. mod.)

E-53335

Noguchi, T., **Petrology and mineralogy of the PCA 91082 chondrite and its comparison with the Yamato-793495 (CR) chondrite,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.8, Tokyo, National Institute of Polar Research, 1995, p.33-62, Refs. p.61-62.

A study of the antarctic PCA 91082 CR chondrite shows that it has some unique petrographic and mineralogical properties not observed in other CR chondrites. About 40% of chondrules contain silica pods in their outermost parts. Silica was probably formed by the adhesion of SiO_2-rich materials during chondrule formation. Chondrules in PCA 91082 experienced a lesser degree of aqueous alteration than those in other CR chondrites; only the peripheries of chondrules are altered in PCA 91082. Fe contents in the phyllosilicates in chondrules are higher than the values reported in other CR chondrites in which chondrules are altered into their cores. In Yamato (Y)-793495, the extent of aqueous alteration is similar to that in PCA 91082. Fe contents of phyllosilicates in chondrules in Y-793495 are also higher than those in the more altered CR chondrites. PCA 91082 contains constituent components which experienced various alteration conditions. (Auth. mod.)

E-53336

Ichikawa, O., Ikeda, Y., **Petrology of the Yamato-8449 CR chondrite,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.8, Tokyo, National Institute of Polar Research, 1995, p.63-78, 15 refs.

The Yamato (Y)-8449 chondrite is a new CR (Renazzo-type) antarctic chondrite, and the constituent minerals coincide in chemical composition with those of the other CR chondrites except in phyllosilicate and metal. FeO and Al_2O_3 contents of phyllosilicates in Y-8449 are richer than those in other CR chondrites. Fe-Ni metal in Y-8449 is classified into two types; one type has an exsolution texture indicating a slow cooling rate of the metal, and the other type has a massive texture free from exsolution texture. Massive Fe-Ni metal in Y-8449 is more homogeneous than that in the other CR chondrites. Groundmass glass and phenocrystic enstatite in Y-8449 chondrules have been replaced by phyllosilicate in the chondrule rims, and the aqueous alteration reaction that produced the phyllosilicate had possibly taken place in a nebula at low temperatures prior to accretion onto the parent body. (Auth.)

E-53337

Kojima, T., Yada, S., Tomeoka, K., **Ca-Al-rich inclusions in three antarctic CO3 chondrites, Yamato-81020, Yamato-82050 and Yamato-790992: record of low-temperature alteration,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.8, Tokyo, National Institute of Polar Research, 1995, p.79-

96, 21 refs.

Ca-Al-rich inclusions (CAIs) in three Yamato chondrites have simil-iar overall textures; most CAIs are rimmed or concentric objects. However, there are considerable differences in mineralogy; almost all of the CAIs in Y-81020 consist of primary high-temperature phases such as melilite, anorthite, fassaite and spinel, while most of the CAIs in Y-82050 and Y-790992 contain major amounts of nepheline and lesser amounts of melilite and anorthite. The texture of CAIs suggest that nepheline and troilite are secondary alteration products formed by replacing mainly melilite and anorthite. Spinel in CAIs and olivine in amoeboid olivine aggregates probably became enriched in Fe along with the alteration. As the alteration proceeded, fassaite and spinel were also replaced by nepheline, and perovskite was replaced by ilmenite and ulvospinel. To compare the relationship between alteration of CAIs and thermal metamorphism on the parent body, metamorphic grades of the three CO chondrites were petrographically determined. The results indicate that the metamorphic grade increases in the same order as that of the degree of alteration of CAIs, i.e. Y-81020<Y-82050<Y-790992. Results raise the possibility that alteration of CAIs may be related to thermal metamorphism which occurred on the meteorite parent body. (Auth. mod.)

E-53338

Yamaguchi, A., Takeda, H., **Mineralogical study of some antarctic monomict eucrites, including Yamato-74356: a unique rock containing recrystallized clastic matrix,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.8, Tokyo, National Institute of Polar Research, 1995, p.167-184, Refs. p.183-184.

Thermal and impact history of four antarctic Yamato monomict eucrites was studied by mineralogical techniques. Although the mineral chemistry of Y-74356 is typical of monomict eucrites, it contains a recrystallized clastic matrix similar to that of some lunar granulitic breccias. Y-74356 experienced shock brecciation during a major thermal event. In contrast, Y-791186 and Y-792510 have pyroxenes of the highest metamorphic degree but the clastic matrices are weakly recrystallized, i.e., these two rocks were not extensively metamorphosed after breccia assembly. This indicates that the process that caused brecciation is distinct from the major thermal event. Y-82037 is a coarse-grained, unbrecciated ordinary eucrite, indicating that it was not affected by the brecciation event, except for the presence of a granoblastic portion in part of the pyroxene crystals. The authors deduce that the thermal metamorphism that formed ordinary eucrites took place on a longer time scale and at a lower temperature than that which formed some lunar granulitic breccias. (Auth. mod.)

E-53339

Thomassin, J.H., Le Coustumer, P., Patrier, P., **Mineralogy and ultrastructure of some alteration products of Yamato-86032 meteorite,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.8, Tokyo, National Institute of Polar Research, 1995, p.185-193, 19 refs.

White products of the antarctic Yamato-86032 meteorite sample were studied using linear localization detector method and TEM (powders examination and ultramicrotomed thin-sections). In addition to the mineral phases of the meteorite (olivine, pyroxene, labradorite), calcium sulfate and hydrous minerals have been identified. The observed glassy matrix has high silica content and the alteration products in contact with glass are mainly Fe-Al and Fe-Al-Na-K-S compounds. The presence of these mineral phases suggests that a sulfuric acid alteration has to be involved for the formation of the white products studied. (Auth.)

E-53340

Kong, P., Ebihara, M., Endo, K., Nakahara, H., **Element distributions in metallic fractions of an antarctic ordinary chondrite ALH-77231(L6),** NIPR Symposium on Antarctic Meteorites, Proceedings. No.8, Tokyo, National Institute of Polar Research, 1995, p.237-249, 23 refs.

A chemical dissolution method based on different leaching rates of kamacite, taenite and tetrataenite in concentrated HF was developed for isolating metal phases from non-magnetic minerals (mainly silicates) in chondritic meteorites, and for separating taenite from kamacite. This method was applied to the antarctic chondrite ALH-77231(L6), to study the elemental distributions between metal and non-magnetic phases and between taenite and kamacite. The separated phases as well as the bulk metal were studied by Mössbauer spectrometry and by INAA. INAA results show that siderophile elements are differently distributed between taenite and kamacite. Most siderophiles have very strong to moderate affinities to taenite, while Co is enriched in kamacite. (Auth. mod.)

E-53341

Mittlefehldt, D.W., Lindstrom, M.M., Wang, M.S., Lipschutz, M.E., **Geochemistry and origin of achondritic inclusions in Yamato-75097, -793241 and -794046 chondrites,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.8, Tokyo, National Institute of Polar Research, 1995, p.251-271, Refs. p.269-271.

Instrumental and radiochemical neutron activation analyses were performed on the host L6 chondrite and five splits of the Yamato (Y)-75097 achondritic inclusion, and achondritic inclusions from the Y-793241 (L6) and Y-794046 (H5) chondrites. The troctolitic inclusions from Y-75097 and Y-793241 show numerous compositional similarities. The REE, however, are highly variable in the Y-75097 inclusion due to variations in modal merrillite. The lack of pyroxene in these inclusions is best explained by assuming the protolith was non-chondritic in bulk composition. However, it is not clear that nebular processes could produce a pyroxene-poor protolith. The siderophile element patterns in these inclusions can be modeled as residual metal left after partial melting of the Fe-FeS system. (Auth. mod.)

E-53342

Sugiura, N., Zashu, S., **Isotopic composition of nitrogen in the PCA 91002 R group chondrite,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.8, Tokyo, National Institute of Polar Research, 1995, p.273-285, Refs. p.284-285.

Nitrogen isotopic composition of the R-group chondrite PCA 91002 was measured. A δ^{15}N value as low as -60 per mill was found in some combustion steps. Since this is a gas-rich meteorite, interpretation of the result is not straightforward, but with the aid of results on an H_2O_2-treated sample, the authors conclude that isotopically light nitrogen is indigenous to the meteorite. The meteorite sample was provided by the Antarctic Meteorite Laboratory of NASA.

E-53343

Nagao, K., Eugster, O., Weigel, A., Miura, Y.N., Koeberl, C., Takaoka, N., **Noble gases, chemical composition, and cosmic-ray exposure age of the Yamato-74357 lodranite,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.8, Tokyo, National Institute of Polar Research, 1995, p.297-303, 14 refs.

Cosmic-ray produced ^{3}He, ^{21}Ne, and ^{38}Ar concentrations and the chemical composition of the Yamato-74357 lodranite have been determined. Concordant concentrations of ^{3}He and ^{21}Ne have been obtained on both samples (Bern and Misasa). The concentration of cosmogenic ^{38}Ar is twice as high in the Bern as in the Misasa sample. The ^{3}He, ^{21}Ne and ^{38}Ar data for both samples yield an average cosmic-ray exposure age of 5.8±2.0 Ma. This age indicates that Yamato-74357 belongs to the lodranite group, which probably originates from a common break-up event of about 5 Ma. Radiogenic ^{4}He and ^{40}Ar concentrations in the Bern sample are higher than those in the Misasa sample by more than a factor of two, suggesting that minerals enriched in U, Th and K are enriched in the finer grained fraction. (Auth.)

E-53344

Zbik, M., Gostin, V.A., **Morphology and internal structure of antarctic cosmic dust spherules: possible links to meteorite fusion crusts,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.8, Tokyo, National Institute of Polar Research, 1995, p.339-351, 11 refs.

Petrographic and SEM comparison of the outer morphology of different antarctic spherules with their internal structure helped to distinguish those spherules that resulted from melting of micrometeorites from the ablation products of meteorites. A chain of possible transformations beginning with unmelted micrometeorites was recognized. Such structural transformations could begin from unmelted cosmic dust of olivine aggregates through granular spherules, to vitrophyric spherules with ghost-olivine glassy ovoidal objects, to vitrophyric, and to skeletal spherules. The fusion crusts of meteorites studied showed that ablation can also produce a variety of spherules. Achondrites could produce glassy smooth and internally compact holohyaline spherules, whereas chondrites could generate spherules of the rough glazed, dendrite decorated morphological types. (Auth.)

E-53347

Zhao, J.X., Shiraishi, K., Ellis, D.J., Sheraton, J.W., **Geochemical and isotopic studies of syenites from the Yamato Mountains, East Antarctica: Implications for the origin of syenitic magmas,** *Geochimica et cosmochimica acta,* Apr. 1995, 59(7), p.1363-1382, 78 refs.

Voluminous syenites were intruded during the waning stage of the granulite facies metamorphism in the Yamato Mountains. The area has been interpreted as part of a Cambrian continental collision zone with regional upper amphibolite to granulite facies metamorphism occurring during the ca. 500-660 Ma period. It is proposed that the syenites were generated by fractionation and magma mixing (with a crustal melt) of a Si-undersaturated alkali basaltic magma in a lower-crust magma chamber, followed by further crystal fractionation/cumulate-melt unmixing at middle to upper crustal levels (<5 kbar). Tectonically, the syenites were probably formed within the hinterland of the proposed Cambrian continental collision zone, with the parental magma being derived ultimately by partial melting of the metasomatised mantle wedge above the deepest part of the subduction zone. Similar models may also apply to the origin of some post-tectonic alkaline dikes in East Antarctica, with their sources being the continental lithospheric mantle previously modified by subduction-related processes. (Auth. mod.)

E-53358

Vaughan, A.P.M., Thistlewood, L., Millar, I.L., **Small-scale convection at the interface between stratified layers of mafic and silicic magma, Campbell Ridges, NW Palmer Land, Antarctic Peninsula: syn-magmatic way-up criteria,** *Journal of structural geology,* July 1995, 17(7), p.1071-1075, 8 refs.

Experimental data suggest that some igneous mafic inclusions are formed at the interface between underlying mafic magma and more silicic magma in a reservoir by a process of gas exsolution and vesiculation. The authors report cm-scale plume-like structures exposed over several m^2 at a candidate interface in a large composite pluton from NW Palmer Land, Antarctic Peninsula and suggest that, as well as representing 'frozen' mafic inclusion information, plume-like structures of this type can be used as way-up criteria and may be of particular value in the interpretation of palaeomagnetic data. (Auth.)

E-53361

Qureshi, A.A., et al, **Fission track dating of biotite mica from Antarctica,** *Radiation measurements. Special volume,* 1995, 25(1-4), Nuclear Tracks in Solids International Conference, 17th, Dubna, Russia, Aug. 24-28, 1994. Proceedings, p.521-522, 6 refs.

A mica sample from an antarctic pegmatite has been dated using fission track dating technique. The determinations made on various parts of the same mica book show age variation due to heterogeneous uranium distribution in the mica due to mobilization of uranium into, or out of, the mica crystal system. The age values cluster around 225 m.y., which is also the period of swelling, rifting and extensive magmatism along the northern rim of the Indo-Pakistan Plate. (Auth.)

E-53362

Yanai, K., ed, Kojima, H., ed, **Catalog of the antarctic meteorites,** Tokyo, National Institute of Polar Research, 1995, 230p., 2 refs.

This catalog of the NIPR collections of antarctic meteorites consists of 36 photographs of 14 individual specimens, in 12 whole and 24 thin sections, 183 diagrams of mineral compositions, 522 bulk chemical compositions, and a list of over 8500 specimens of meteorites collected at various antarctic locations between Dec. 1969 and Dec. 1994. Their original weights, types, class and mineral data for identification and classification are given. Non-antarctic meteorites, tektites and related materials are also listed.

E-53363

Von Guerard, P., McKnight, D.M., Harnish, R.A., Gartner, J.W., Andrews, E.D., **Streamflow, water-temperature, and specific conductance data for selected streams draining into Lake Fryxell, lower Taylor Valley, Victoria Land, Antarctica,** *U.S. Geological Survey. Open-file report,* 1995, No.94-545, 65p., 5 refs.

During the 1990-91 and 1991-92 field seasons in Antarctica, streamflow, water temperature, and specific conductance data were collected on 11 streams draining into Lake Fryxell. Instantaneous streamflow for all streams ranged from 0 to 0.651 m^3/s. Water temperatures for all streams ranged from 0 to 14.3°C. Specific conductance for all streams ranged from 11 to 491 microseisms/cm at 25°C. It is probable that streamflow in the Lake Fryxell Basin during 1990-92 was larger than average. Examination of the 22-year streamflow record for the Onyx River in the Wright Valley revealed that in 1990 streamflow began earlier than for any previous year recorded and that the peak streamflow of record was exceeded. Similar high-flow conditions occurred during the 1991-92 field season. Thus, the data collected on streams draining into Lake Fryxell during 1990-92 are representative of greater than average streamflow conditions. (Auth. mod.)

E-53365

Antarctic Meteorite Working Group, **Antarctic meteorite newsletter, Vol.18, No.2, Aug. 1995,** Houston, Texas, NASA Johnson Space Center, 1995, 25p.

This newsletter contains preliminary descriptions and classifications of meteorites that were completed since publication of issue 18(1) (Feb. 1995). Specimens of special petrologic type (carbonaceous chondrite, unequilibrated ordinary chondrite, achondrite, etc.) are represented by separate descriptions unless they are paired with previously described meteorites. However, some specimens of non-special petrologic type are listed only as single line entries in a table. Macroscopic descriptions of stony meteorites were performed at NASA/JSC. These descriptions summarize hand-specimen features observed during initial examination. Classification is based on microscopic petrography and reconnaissance-level electron microprobe analyses using polished sections prepared from a small chip of each meteorite. For each stony meteorite the sample number assigned to the preliminary examination section is included. In some cases, a single microscopic description was based on thin sections of several specimens believed to be members of a single fall.

E-53370

Tambussi, C.P., Noriega, J.I., Gaździcki, A., Tatur, A., Reguero, M.A., Vizcaíno, S.F., **Ratite bird from the Paleogene La Meseta Formation, Seymour Island, Anarctica,** *Polish polar research,* 1994, 15(1-2), p.15-20, With Spanish and Polish summaries. 33 refs.

Fossil bird remains assignable to ratites (palaeognathous birds) are described from the Paleogene strata of the La Meseta Formation of Seymour I., Antarctic Peninsula. This record amplifies Gondwana's avian history. (Auth. mod.)

E-53379

Weaver, S.D., Adams, C.J., Pankhurst, R.J., Gibson, I.L., **Granites of Edward VII Peninsula, Marie Byrd Land: anorogenic magmatism related to Antarctic-New Zealand rifting,** Hutton Symposium on the Origin of Granites and Related Rocks, 2nd, Canberra, 23-28 Sep. 1991. Proceedings. Edited by P.E. Brown and B.W. Chappell, Boulder, CO, USA, Geological Society of America, 1992, p.281-290, Papers in this volume were originally published as *Transactions of the Royal Society of Edinburgh: Earth Sciences,* Vol.83, Parts 1 and 2. 28 refs.

DLC QE462.G7H88 1991

Syenogranites and monzogranites of Edward VII Peninsula, Marie Byrd Land, represent magmatism associated with continental rifting and the separation of New Zealand from West Antarctica in the mid-Cretaceous. These coarse-grained, leucocratic, subsolvus biotite granites occur as five small plutons cutting Lower Palaeozoic metasediments. Petrographic features include the predominance of microcline perthite over albite, bipyramidal smoky quartz, red-brown biotite and accessory ilmenite, zircon, apatite, monazite and fluorite. Enclaves are absent and miarolitic cavities are rare. The geochemistry of the Edward VII Peninsula granites suggests an infracrustal I-type source, and regionally available Devonian-Carboniferous I-type granodiorites and tonalites satisfy the isotopic constraints. The granites classify as A-type (preferred term A-subtype) and Within Plate Granites on standard diagrams, but the least fractionated rocks clearly indicate the I-type, Volcanic Arc Granite geochemical signatures of their inferred crustal sources. (Auth. mod.)

E-53380

Hammer, W.R., **New therapsids from the upper Fremouw Formation (Triassic) of Antarctica,** *Journal of vertebrate paleontology,* Mar. 1995, 15(1), p.105-112, 23 refs.

Therapsids from the base of the upper Fremouw Formation in the Beardmore Glacier region are described. They are part of a new fauna that also includes large capitosaurid temnospondyl amphibians. *Cynognathus* sp., as well as indeterminate specimens of cynognathids, a diademodontid and a kannemeyeriid occur. While the presence of *Cynognathus* and the kannemeyeriid suggest a late Scythian (late Early Triassic) age for this level in the Fremouw Formation, some aspects of the indeterminant taxa may indicate a slightly younger Anisian (early Middle Triassic) age. (Auth.)

E-53381

Goin, F.J., Carlini, A.A., **Early Tertiary microbiotheriid marsupial from Antarctica,** *Journal of vertebrate paleontology,* Mar. 1995, 15(1), p.205-207, 25 refs.

Various mammalian fossils have been found in La Meseta Formation on Seymour I. Among them have been marsupial remains including the one discussed in this note, described as a small edentulous dentary. A preliminary report of the latter was previously given in abstract form in 1988.

E-53386

Sandiford, M., Coblentz, D., **Plate-scale potential energy distributions and the fragmentation of ageing plates,** *Earth and planetary science letters,* Aug. 1994, 126(1-3), p.143-159 (Pertinent p.151-159), 27 refs.

Analytical models for simple plate geometries using lithospheric density models consistent with small positive (+6 m) geoid anomalies across continental margins show that the growth of oceanic lithosphere over a period of 200 Ma may contribute to a decline in the mean plate potential energy (ppe) and thus contribute a mean extensional stress difference in continental lithosphere of up to about 8 MPa. These estimates are sensitive to the assumed mean continental potential energy, about which there is some uncertainty. In the African and antarctic plates the ageing of the ocean lithosphere since the late Jurassic is estimated to have contributed to a decline in ppe of about -0.6×10^{12} and -9.5×10^{12} N/m respectively, contributing a mean stress difference of about 5 MPa and 7.5 MPa in the respective continents. Whereas the predicted stress changes associated with ageing of the oceanic lithosphere are significantly smaller than most laboratory-based estimates of the extensional strength of the lithosphere, they may provide an important contribution to the stress fields that eventually led to the fragmentation of ageing plates. (Auth. mod.)

E-53407

Kurat, G., Koeberl, C., Presper, T., Brandstätter, F., Maurette, M., **Antarctic micrometeorites,** *Lunar and Planetary Institute, Houston, TX. Technical report,* 1994, LPI/TR-94-02, Workshop on the Analysis of Interplanetary Dust Particles, Houston, TX, May 15-17, 1993, p.34-36, N95-10961, 32 refs.

Micrometeorites in the size range of 50-500 microns dominate the flux onto the Earth. Contrary to theoretical predictions, many of them survive atmospheric entry almost unchanged. Such micrometeorites can be collected from the antarctic ice sheet where they account for a surprisingly large proportion of the total dust content of the ice. Early studies of this important class of extraterrestrial material have revealed that some antarctic micrometeorites are similar to CM chondrites in chemical bulk composition and mineral composition, while a few seem to resemble CI chondrites. However, none of the micrometeorites investigated so far match CM or CI chondrites exactly, nor is there a match between average bulk micrometeorite composition and that of any other chondrite class. Also, the micrometeorite mineral chemistry is different from that of carbonaceous chondrites. Several elements are depleted in micrometeorites as compared to carbonaceous chondrites while some are enriched. (Auth. mod.)

E-53408

Maurette, M., Hammer, C., Harvey, R., Immel, G., Kurat, G., Taylor, S., **Collection and curation of IDPs in the stratosphere and below. Part 2: The Greenland and antarctic ice sheets,** *Lunar and Planetary Institute, Houston, TX. Technical report,* 1994, LPI/TR-94-02, Workshop on the Analysis of Interplanetary Dust Particles, Houston, TX, May 15-17, 1993, p.36-40, N95-10962, 24 refs.

The recovery of unmelted to partially melted 50-400 µm-sized IDP's (interplanetary dust particles) from the Greenland and antarctic ice sheets is described. Ice samples are melted in the field by steam generators and pumped through sieves to obtain IDPs. More than 40,000 IDPs have been recovered from 360 tons of ice at Cap Prudhomme, Antarctica, grouped in four size fractions (25-50, 50-100, 100-400, and >400 µm), but mostly in the 50-100 µm-size fraction, and are now stored at CSNSM (Centre de Spectrométrie Nucléaire et de Spectrométrie de Masse) in Orsay, France. This is the purest and richest sample of IDPs ever extracted from terrestrial sediments.

E-53446

Pimpirev, Ch., Pavlishina, P., **Tertiary palynomorphs from the Le May Group, Alexander Island, Antarctica,** *Bulgarska akademiia na naukite, Sofia. Doklady,* 1994, 47(3), p.71-74, 8 refs.

During the joint British-Bulgarian project in the 1987-1988 field season in northern Alexander I., detailed sedimentological sections and collection of microfossils at the turbidite sequences were made. One sample from the cross section in the Douglas Range contained calcareous nannofossils for which, it is argued in this paper, a wrong age determination was made. Revising the material, later researchers changed the age of the specimen from Upper Jurassic to Tertiary. The lithology and palynological data of the samples containing palynomorph assemblages are discussed.

E-53452

Marks, K.M., Stock, J.M., **Asymmetric seafloor spreading and short ridge jumps in the Australian-Antarctic Discordance,** *Marine geophysical research,* Aug. 1995, 17(4), p.361-373, 30 refs.

The crenulated geometry of the Southeast Indian ridge within the Australian-Antarctic discordance is formed by numerous spreading ridge segments that are offset, alternately to the north and south, by transform faults. Suggested causes for these offsets, which largely developed since ca. 20 Ma, include asymmetric seafloor spreading, ridge jumps, and propagating rifts that have transferred seafloor from one flank of the spreading ridge to the other. Each of these processes has operated at different times in different locations of the discordance; here is documented an instance where a small (≈20 km), young (<0.2 Ma) southward ridge jump has contributed to the observed asymmetry. When aeromagnetic anomalies are superposed on gravity anomalies computed from Geosat GM and ERM data, it is found that in segment B4 of the discordance (between 125° and 126°E), the roughly east-west-trending gravity low correlated with the axial valley is 20-25 km south of the ridge axis position inferred from the center of magnetic anomaly 1. Elsewhere in the discordance, the inferred locations of the ridge axis from magnetics and gravity are in excellent agreement. (Auth. mod.)

E-53455

Johnson, A.C., Swain, C.J., **Further evidence of fracture-zone induced tectonic segmentation of the Antarctic Peninsula**

from detailed aeromagnetic anomalies, *Geophysical research letters,* July 15, 1995, 22(14), p.1917-1920, 20 refs.

Aeromagnetic anomaly data collected between 67 and 70°S crossing the Antarctic Peninsula and adjacent offshore areas show a prominent NW-SE trend in the magnetic fabric. Apparent lateral offsets, previously recognized in the Pacific Margin Anomaly, have been mapped in detail and are shown to be much smaller than previously suggested. A 35 km wide zone of subdued magnetic anomalies at the Western edge of the Pacific Margin Anomaly, bounded by these apparent offsets, is interpreted as a downfaulted block of the mafic-intermediate batholith thought to be responsible for the Pacific Margin Anomaly. The trends of both fracture zones and magnetic lineaments strongly support the link between faulting in the Antarctic Peninsula magmatic arc and offshore tectonics. (Auth.)

E-53465

Adams, C.J., Seward, D., Weaver, S.D., **Geochronology of Cretaceous granites and metasedimentary basement on Edward VII Peninsula, Marie Byrd Land, West Antarctica,** *Antarctic science,* Sep. 1995, 7(3), p.265-276, 33 refs.

Rb-Sr ages of Swanson Formation on Edward VII Peninsula indicate a Late Ordovician age, 421-432 Ma, for regional metamorphism. K-Ar ages of 113-440 Ma reflect a second thermal metamorphism during emplacement of widespread Cretaceous granites. Rb-Sr ages of five monzogranite/syenogranitic plutons of Byrd Coast Granite are in the range 95-105 Ma. These correlate with Byrd Coast Granite (100-110 Ma) and with Cretaceous granitoids on the Campbell Plateau. K-Ar mica/hornblende and fission-track apatite/zircon ages indicate that regional cooling began c. 90-100 Ma immediately after granite emplacement. Uplift continued throughout the peninsula during the period 55-100 Ma (Late Cretaceous-Early Tertiary), associated with regional uplift in the rift-drift stages of Gondwana break-up at the Southwest Pacific spreading center. Apatite fission track ages show that during Late Cretaceous-Early Tertiary time the peninsula behaved as two blocks. The Alexandra Mountains were exhumed 20 Ma before the Rockfeller Mountains and are possibly separated by a fault active initially in the mid-Cretaceous or earlier, and later reactivated in the Late Cretaceous-Early Tertiary. (Auth.)

E-53466

Aguirre-Urreta, M.B., Marenssi, S.A., Santillana, S.H., **New Eocene crab (Crustacea, Decapoda) from Seymour Island, Antarctica,** *Antarctic science,* Sep. 1995, 7(3), p.277-281, Refs. p.280-281.

A new Xanthid crab, *Tumidocarcinus foersteri* n.sp. is described from the La Meseta Formation on Seymour I. The fossils were obtained from the Allomember Submeseta of Late Eocene age. As other representatives of the genus *Tumidocarcinus* were only known from New Zealand and Australia, this finding provides new insights on the palaeobiogeography of high latitude faunas during the Early Tertiary. (Auth.)

E-53467

Craw, D., Cook, Y.A., **Retrogressive fluids and vein formation during uplift of the Priestley metamorphic complex, north Victoria Land, Antarctica,** *Antarctic science,* Sep. 1995, 7(3), p.283-291, Refs. p.290-291.

The poly-deformed Priestley schist (Wilson Terrane) of north Victoria Land ranges in metamorphic grade from lower greenschist facies to upper amphibolite facies. All grades of schist have been affected by structurally controlled retrogressive H_2O-CO_2 fluids with 45-70 mole % CO_2. The fluids have deposited quartz-carbonate veins with pyrite and chlorite or biotite in late stage structures. Veins typically constitute <1% of the rock mass, but in one greenschist facies area >10% of the rock is vein. Veins in higher grade schists were boudinaged after formation, and many have been annealed. Primary fluid inclusions are preserved in veins in biotite zone schists in two localities. At one locality, entrapment of immiscible fluids occurred during vein formation, at about 280-300°C and 700±200 bars fluid pressure. The aqueous fluid is slightly saline (4 wt % NaCl equivalent). At the other primary fluid inclusion locality, veins were formed from a single phase fluid (c. 70 mole % CO_2) at 200-350°C and 1600±500 bars fluid pressure. (Auth. mod.)

E-53468

Woolfe, K.J., Arnot, M.J., Bradley, G.M., **Jurassic titaniferous ironstone in a Devonian host: Pivot Coal Measures expunged,** *Antarctic science,* Sep. 1995, 7(3), p.293-301, Refs. p.300-301.

The Devonian Pivot Coal Measures in southern Victoria Land are non-carbonaceous. The sequence contains bedding-parallel titaniferous ironstones up to 50 cm thick, but no coal or carbonaceous shale; the unit is consequently renamed Pivot Member of the Arena Sandstone. The more Fe-Ti oxide-rich beds appear black and coal-like with conchoidal fracture and closely spaced cleat-like fractures. The coal-like beds grade laterally and vertically into less altered sedimentary rocks in which fine bedding-parallel concentrations of Fe-Ti oxide pick out parting surfaces on ripples and other sedimentary structures. Thin section petrography shows that the Fe-Ti oxide is replacive, and outcrop relationships show that the replacement was related to dolerite intrusion 200 million years after the sedimentary host was deposited. Replacement of muscovite, biotite and chlorite by Fe-Ti oxide occurred at 179 Ma, at pressures of 0.3-0.4 kbar and at temperatures as low as 380°C. (Auth.)

E-53469

Cox, S.C., Allibone, A.H., Krynauw, J.R., Ricci, C.A., Hervé, F., LeMasurier, W.E., **Naming of igneous and metamorphic rock units in Antarctica: recommendation by the SCAR Working Group on Geology,** *Antarctic science,* Sep. 1995, 7(3), p.303-306, Refs. p.305-306.

The discussion part of this debate points out that a nomenclature scheme which emphasizes lithological characteristics with the exclusion of structural features and field relations applied to the granitoid rocks in southern Victoria Land creates some problems, examples of which are given. In the reply, three major aspects of igneous intrusions, on which the SCAR Working Group on Geology recommendations on the use of form or structure names are based, are reviewed. It is argued that the recommendations do not advocate ignoring basic geological techniques such as the use of structural features and field relations.

E-53528

Calace, N., Campanella, L., De Paolis, F., Petronio, B.M., **Characterization of humic acids isolated from antarctic soils,** *International journal of environmental analytical chemistry,* 1995, Vol.60, p.71-78, 23 refs.

Humic acids isolated from antarctic soils have been characterized by FTIR, ^{13}C NMR and element analysis; aminoacid content has been determined after hydrolysis with 6 N HCl. Nitrogen and hydrogen contents of HAs are very high, indicating that more proteinaceous material, covalently bound to the structures, has not undergone appreciable transformation during the humification processes. Moreover, the aliphatic carbon prevails over the aromatic one, owing to the nature of non-ligniferous material as precursor. With the progress of the humification process obtained in temperate climatic conditions, the proteinaceous material decreases, as shown by analysis of aminoacids, and the molecular weight of the humic compounds increases, whereas aromatic carbon does not. (Auth.)

E-53529

Campanella, L., Petronio, B.M., Braguglia, C., Cini, R., Degli Innocenti, N., **Study of humic fractions from water of an antarctic lake,** *International journal of environmental analytical chemistry,* 1995, Vol.60, p.49-60, 29 refs.

Soluble humic compounds isolated from water of an antarctic lake have been characterized by IR, NMR spectrophotometry and fluorimetric measurements. Gel chromatography on Sephadex G resins of fulvic acids, present in the water in high concentration, has shown that a great fraction of them consists of compounds having molecular weight greater than 50,000 dalton. The high level of humics and the presence in soluble form of compounds having high molecular weight and similar structure to the humic acids of lake sediments may be due to the high pH value of the water examined. (Auth.)

E-53530

Bradshaw, M.A., Webers, G.F., **Devonian rocks of Antarctica,** International Symposium on the Devonian System, 2nd, Calgary, Canada, 1987. Proceedings. Vol.1: Regional syntheses, edited by N.J. McMillan, A.F. Embry, and D.J. Glass, Calgary, Canadian Society of Petroleum Geologists, 1988, p.783-795, Refs. p.793-795.

DLC QE665.I65

In Antarctica Devonian rocks accumulated in three separate areas that may have been intermittently connected. Epicontinental sedimentation occurred on the consolidated margin of Gondwana in south Victoria Land, the Ohio Range and the Pensacola Mountains, and comprises the lower Beacon Supergroup (1400 m). Sequences of trace fossils in arenaceous sediments in south Victoria Land suggest littoral conditions during the Early Devonian, followed by a regression to alluvial plain deposition by the Late Devonian. A thin sequence of nearshore marine sediments with a shelly Malvinokaffric Emsian fauna occurs in the Ohio Range (50 m) and has been truncated by post-Devonian erosion. This sequence is an extension of the Pensacola basin in which thick and predominantly fluvial sedimentation occurred, with conditions becoming intermittently marine at the top. Late Devonian magmatic arc rocks with associated non-marine plant bearing sediments in Marie Byrd Land and north Victoria Land probably belonged to the same terrane on the outer margin of Gondwana during the Devonian. (Auth. mod.)

E-53543

Latter, J.H., ed, **IAVCEI proceedings in volcanology. 1. Volcanic hazards: assessment and monitoring,** Berlin, Springer-Verlag, 1989, 625p., Refs. passim. For selected papers see E-53546, L-53544, and L-53545.

DLC QE527.5.V65

The contributions in this book were presented at the International Volcanological Congress held in New Zealand Feb. 1-9, 1986. The book is divided into two parts, with the first 15 chapters dealing mainly with hazards assessments, and the remainder mostly with monitoring. Three of the papers concern Mt. Erebus: classification of volcanic earthquakes, infrasonic recordings of Strombolian eruptions, and deformation, respectively.

E-53546

Blick, G.H., Otway, P.M., Scott, B.J., **Deformation monitoring of Mt. Erebus, Antarctica, 1980-1985,** IAVCEI proceedings in volcanology. 1. Volcanic hazards: assessment and monitoring, edited by J.H. Latter, Berlin, Springer-Verlag, 1989, p.554-560, 4 refs.

DLC QE527.5.V65

Deformation studies of the summit area of Mt. Erebus commenced in Dec. 1980. Triangulation and tilt-levelling networks have been surveyed annually, in conjunction with the International Mount Erebus Seismic Studies (IMESS) project. Only minor deformation has been detected. Measurements from the triangulation network on the summit indicate cumulative expansion of approximately 50 mm across the crater. Most of this appears to have occurred in 1982 and 1984, the latter period coinciding with increased volcanic activity. Tilts of more than 15 microradians/yr have been recorded on several of the tilt-levelling patterns, but their directions appear random and do not correlate with volcanic activity. Tilts recorded during 1985 are larger than those recorded previously. The significance of this is not yet understood, but they are thought to be due to local ground instability rather than to volcanic deformation. (Auth.)

E-53561

Krynauw, J.R., Behr, H.J., Van den Kerkhof, A.M., **Sill emplacement in wet sediments: fluid inclusion and cathodoluminescence studies at Grunehogna, western Dronning Maud Land, Antarctica,** *Journal of the Geological Society, London,* Sep. 1994, 151(5), p.777-794, 38 refs.

The Grunehogna and Kullen sills of western Queen Maud Land were emplaced into water-saturated, partially lithified sediments of the mid-Proterozoic Ritscherflya Supergroup. Fluid inclusion and optical and scanning electron microscope cathodoluminescence studies of quartz grains within and adjacent to the sills showed that only a single generation of later fluid inclusions is present. The fluids are Na-K-Ca-Cl aqueous solutions with temperatures of homogenization between 95 and 105°C. Individual quartz particles in the sedimentary rocks above the interactive zone have unique fluid inclusion populations. Petrographic and cathodoluminescence evidence indicated that there are three types of quartz grains in the interactive zone. These consist of (i) a xenocrystic type, (ii) a high-temperature quartz that crystallized either from the magma or as a result of anatectic melting of xenolithic (and/or xenocrystic) material, and (iii) euhedral quartz crystals that have grown in vugs in the peripheral zone. (Auth. mod.)

E-53562

Hall, C.E., Cooper, A.F., Parkinson, D.L., **Early Cambrian carbonatite in Antarctica,** *Journal of the Geological Society, London,* July 1995, 152(4), p.721-728, 61 refs.

Nepheline syenite bodies intrude the basement Koettlitz Group gneisses of the Transantarctic Mountains of south Victoria Land. A calcite-fluorite-biotite-alkali feldspar dyke has mineralogical, trace element, stable isotope, and radiogenic isotope characteristics similar to the host syenite and distinct from the country rock Koettlitz Group marble. The dyke is interpreted as the first carbonatite to be described from Antarctica. Zircon in the carbonatite has been dated by U-Pb techniques as 531 Ma, early Cambrian. This age occurs within the range of metamorphism, deformation and subduction-related granitoid intrusive events associated with the Ross Orogeny. Whether the nepheline syenite and carbonatite igneous activity occurred strictly contemporaneously with plate convergence and granitoid genesis or marks an extensional interlude, awaits the detailed unravelling of tectonic events along this segment of the Neoproterozoic to early Cambrian margin of Antarctica. (Auth.)

E-53563

Millar, I.A., Storey, B.C., **Early Paleozoic rather than Neoproterozoic volcanism and rifting within the Transantarctic Mountains,** *Journal of the Geological Society, London,* May 1995, 152(3), p.417-420, 26 refs.

New U-Pb dating of zircons separated from felsic volcanic rocks of the Patuxent and Gambacorta formations from the Pensacola Mountains in the Transantarctic Mountains yields earliest Ordovician ages of ca. 500 and 501 Ma respectively. The dated felsic volcanic rock of the Gorecki Felsite Member of the Patuxent Formation is important tectonically, as the felsite, together with mafic volcanic rocks, were previously considered to provide key evidence of a Neoproterozoic rifting event prior to separation of Laurentia from East Antarctica. The new data do not necessarily refute this event but indicate a previously unrecognized early Ordovician period of bimodal magmatism and extension along the Transantarctic Mountains. (Auth. mod.)

E-53564

Pirrie, D., Crame, J.A., **Late Jurassic palaeogeography and anaerobic-dysaerobic sedimentation in the northern Antarctic Peninsula region,** *Journal of the Geological Society, London,* May 1995, 152(3), p.469-480, 44 refs.

Late Jurassic anaerobic-dysaerobic mudstones crop out on both the Weddell Sea (back-arc) and Pacific (fore-arc) margins of the northern Antarctic Peninsula. The only known occurrence on the Pacific margin of the Antarctic Peninsula is the Anchorage Formation of Livingston I. This mudstone-dominated unit comprises interbedded volcaniclastic sandstones, pyroclastic/epiclastic tuffs and radiolarian mudstones. The volcaniclastic sandstones are interpreted as representing deposition from turbidity currents. The tuffs represent sedimentation by both primary airfall processes and resedimentation by low concentration turbidity currents. The radiolarian mudstones represent suspension sedimentation, and reveal an upward increase in bioturbation with a transition from anaerobic-dysaerobic conditions to dysaerobic-aerobic conditions. These facies and the observed vertical change in oxygenation conditions are similar to those seen in the Nordenskjöld Formation on the Weddell Sea margin of the Antarctic Peninsula. (Auth. mod.)

E-53570

Carrington, D.P., Harley, S.L., **Stability of osumilite in metapelitic granulites,** *Journal of metamorphic geology,* Sep. 1995, 13(5), p.613-625, 49 refs.

Experiments involving the dehydration melting of biotite in synthetic metapelites were conducted in the Napier Complex in the range 850-1000°C. Both the mineral assemblages and phase compositions reported from well-documented natural examples of osumilite-bearing rocks are reproduced by the experiments at P-T conditions similar to those previously estimated for these occurrences. Peak metamorphic P-T conditions can be reliably inferred from distinctive osumilite-bearing assemblages identified in the phase diagrams, thereby avoiding the problems of diffusional re-equilibration. Integration of the experimental data with recent independent experiments allows extension of the petrogenetic grid to higher temperatures. The extended grid is applied to assess and refine the metamorphic history of the Napier Complex: the high-P stability limit for osumilite in the Napier Complex is 9-10 kbar, the prograde P-T-t path is not necessarily anticlockwise and isobaric cooling in the Scott and Tula mountains occurred, respectively, at pressures greater and less than reactions in the range 8-9 kbar. (Auth. mod.)

E-53577

Dalziel, I.W.D., Knoll, A., Moores, E., **Penrose Conference report: Late Precambrian tectonics and the dawn of the Phanerozoic,** *GSA today,* Jan. 1994, p.1-3, Reprint.

This conference was held to explore the tectonics and paleogeography of the Neoproterozoic and earliest Phanerozoic eras (approximately 1000-500 Ma), and their possible influence on the profound paleoenvironmental and biological events of this interval. It was perhaps the first conference to focus on the events of that time period both on a global scale and from an interdisciplinary perspective. Geologists and geophysicists working in all continents, including Antarctica, sat down with geochemists and paleobiologists interested in the biogeochemical and evolutionary events that culminated in the Cambrian explosion of macroscopic animals. Held Oct. 18-23, 1992, at Furnace Creek Ranch in Death Valley, CA, the conference was attended by 68 scientists from 12 countries on 5 continents.

E-53585

Scorzelli, R.B., Souza Azevedo, I., Funaki, M., **Tetrataenite in metallic grains of the antarctic L6 chondrite ALHA 76009,** *Hyperfine interactions,* Nov. 1994, 91(1-4), p.535-539, 14 refs.

Mössbauer X-ray diffraction and electron microscopy studies reveal that segregation and ordering occurred in the metal particles of the antarctic L6 chondrite ALHA 76009. The ordered crystal structure of AuCu type (tetrataenite) was detected coexisting with the disordered 50-50 taenite. (Auth.)

E-53586

Endo, K., Hirunuma, R., Shinonaga, T., Ebihara, M., Nakahara, H., **Mössbauer spectroscopic study of meteorites recovered on Antarctica,** *Hyperfine interactions,* Nov. 1994, 91(1-4), p.557-561, 7 refs.

The chemical states of iron in sixteen antarctic meteorites belonging to H-group chondrites were studied by means of Mössbauer spectroscopy. An Fe-Ni alloy, troilite, paramagnetic Fe(III), and two kinds of paramagnetic Fe(II) were observed in each meteorite. The Mössbauer parameters indicate that the Fe(II) components can be assigned to olivine and some pyroxenes. The relative area intensities of Fe(III) in the chondrites correlated positively with iodine content, which was determined by radiochemical neutron activation analysis, while those of two Fe(II)-species correlated negatively with the content. On the basis of the data on the halogen and the Mössbauer spectroscopy, the terrestrial contamination of antarctic meteorites is discussed. (Auth.)

E-53602

Barker, P.F., **Tectonic framework of the East Scotia Sea,** Backarc basins: tectonics and magmatism. Edited by B. Taylor, New York, Plenum Press, 1995, p.281-314, Refs. p.312-314.

DLC QE511.2.B33

This chapter reviews the tectonic evolution of the East Scotia Sea, testing and extending previously published conclusions in light of the additional and expanded data sets now available. The East Scotia Sea floor was generated behind the east-migrating South Sandwich Trench, at a spreading center now lying along 30°W. On its western flank, lineated magnetic anomalies are identified out to at least anomaly 5 (10-11 Ma) and probably out to anomaly 5B (ca. 15 Ma). Spreading was essentially symmetric at about 27 mm/year from 15 Ma to about 5-7 Ma, then slowly accelerated. From 4 Ma to 1.7 Ma, spreading was at 50 mm/year and slightly asymmetric. Since 1.7 Ma, spreading has been up to 15% asymmetric, favoring accretion to the arc flank, within an overall rate of 65 mm/year. (Auth. mod.)

E-53603

Lawver, L.A., Keller, R.A., Fisk, M.R., Strelin, J.A., **Bransfield Strait, Antarctic Peninsula: active extension behind a dead arc,** Backarc basins: tectonics and magmatism. Edited by B. Taylor, New York, Plenum Press, 1995, p.315-342, Refs. p.338-342.

DLC QE511.2.B33

Bransfield Strait is an example of an extensional basin formed by rifting within a continental volcanic arc. The Antarctic Peninsula is the product of at least 200 m.y. of subduction with the majority of the exposed rocks related to continental arc volcanism older than 20 Ma. Volcanism in Bransfield Strait started by 0.3 Ma and continues today. This new volcanism maintains some of the chemical signatures of the old arc volcanism but also has signatures transitional between arc rocks and backarc basin rocks. On the basis of high heat flow, active volcanism, extensional faulting, and earthquake fault plane mechanisms, Bransfield Strait is an active extensional basin forming within the Antarctic Peninsula. Seismic refraction work in Bransfield Strait indicates some thinning of continental crust, but the basin itself is underlain by as much as 30 km of anomalous crustal material. (Auth. mod.)

E-53605

Frenot, Y., Van Vliet-Lanoë, B., Gloaguen, J.C., **Particle translocation and initial soil development on a glacier foreland, Kerguelen Islands, Subantarctic,** *Arctic and alpine research,* May 1995, 27(2), p.107-115, 44 refs.

The first stages of soil formation in the subantarctic are poorly known. In the Kerguelen Is., initial soil development was studied along a chronosequence (0-200 yr old) on a glacier foreland in a largely ahumic environment. The role of organic matter and attendant weathering is much less than the physical processes related to the high precipitation on the Kerguelen glacier forelands where mechanical weathering, frost-heaving, and particle translocation are dominant. These processes can be considered as an initial, prebiotic pedogenesis development in oligotrophic conditions. Colonization processes occur but the establishment of plant communities is slow, limited by nutrient and water availability. After a delay of two centuries, biotic pedogenesis could supplement mechanical pedogenesis as shown by the development of the new A0/A1 horizon, rejuvenating the old sites. (Auth. mod.)

E-53616

Lowell, T.V., et al, **Interhemispheric correlation of Late Pleistocene glacial events,** *Science,* Sep. 15, 1995, 269(5230), p.1541-1549, 49 refs.

A radiocarbon chronology shows that piedmont glacier lobes in the Chilean Andes achieved maxima during the last glaciation at 13,999 to 14,890, 21,000, 23,060, 26,940, 29,600, and ≥33,500 carbon-14 years before present (^{14}C yr B.P.) in a cold and wet Subantarctic Parkland environment. The last glaciation ended with massive collapse of ice lobes close to 14,000 ^{14}C yr B.P., accompanied by an influx of North Patagonian Rain Forest species. In the Southern Alps of New Zealand, additional glacial maxima are registered at 17,720 ^{14}C yr B.P., and at the beginning of the Younger Dryas at 11,050 ^{14}C yr B.P. These glacial maxima in mid-latitude mountains rimming the South Pacific were coeval with ice-rafting pulses in the North Atlantic Ocean. Furthermore, the last termination began suddenly and simultaneously in both polar hemispheres before the resumption of the modern mode of deep-water production in the Nordic Seas. Such interhemispheric coupling implies a global atmospheric signal rather than regional climatic changes caused by North Atlantic thermohaline switches or Laurentide ice surges. (Auth.)

E-53617

Kohn, M.J., Spear, F.S., Harrison T.M., Dalziel, I.W.D., **^{40}Ar/^{39}Ar geochronology and P-T-t paths from the Cordillera**

Darwin metamorphic complex, Tierra del Fuego, Chile, *Journal of metamorphic geology,* Mar. 1995, 13(2), p.251-270, 78 refs.

In this paper, $^{40}Ar/^{39}Ar$ data are presented for hornblende, muscovite, biotite and K-feldspar and used in conjunction with previously published geochronological data to determine the post-peak-metamorphic cooling history for different areas in the complex. These T-t paths are used with previously published petrological data to develop and critically evaluate one-dimensional thermal models for areas that represent different metamorphic grades. The thermal and exhumation history of Cordillera Darwin is then compared with that observed for several other metamorphic complexes described in the literature, to draw inferences about the extensional behavior of continental crust. (Auth. mod.)

E-53618

Coria, R.A., Salgado, L., **New giant carnivorous dinosaur from the Cretaceous of Patagonia,** *Nature,* Sep. 21, 1995, 377(6546), p.224-226, 17 refs.

A new giant carnivorous dinosaur is reported from the Upper Cretaceous of northwestern Patagonia (Argentina). This new taxon, *Giganotosaurus carolinii* gen. et. sp. nov., is characterized by a proportionally low skull, a reduced shoulder girdle, and robust vertebrae and hind limbs. It represents a primitive evolutionary iteration of large theropods, and provides an opportunity to examine the Gondwanan dinosaur palaeoecommunities and their relationships to those from Laurasia. Several characters place *G. carolinii* within the Tetanurae, and closer to Neotetanurae than to Torvosauroidea. *G. carolinii* is the largest theropod ever recorded from the Southern Hemisphere, and is probably the world's biggest predatory dinosaur, having a body 12.5 m long and an estimated weight of 6 to 8 tonnes. (Auth. mod.)

E-53625

Hart, S.R., Blusztajn, J., Craddock, C., **Cenozoic volcanism in Antarctica: Jones Mountains and Peter I Island,** *Geochimica et cosmochimica acta,* Aug. 1995, 59(16), p.3379-3388, Refs. p.3387-3388.

Cenozoic volcanism is widespread along the Pacific coast of Antarctica; a relationship to the rifting of the West Antarctic Rift System is obvious, but the possible role for mantle plumes is not established. The authors compare here complete geochemical and strontium, neodymium, and lead isotopic data for volcanic rocks from one probable plume on Peter I Island with data from rift-related volcanic rocks from the nearby Jones Mountains. The alkali basalts from Peter I are similar in most respects to average oceanic island basalt, and the authors propose recognition of this island as the most southerly known oceanic plume/hotspot. The volcanics from the Jones Mountains share many trace element and isotopic characteristics with the Peter I volcanics. Basalts from the Jones Mountains are distinct from those of Peter I principally in their much lower $^{207/204}Pb$ ratios, and their low and non-OIB-like Ce/Pb ratios (8.5-17.6). To explain this difference, the authors propose that a minor component of subduction-impregnated subcontinental lithosphere has been incorporated into the rift-related Jones Mountains volcanics that is not present in the oceanic Peter I plume. (Auth. mod.)

E-53648

Vaughan, A.P.M., **Circum-Pacific mid-Cretaceous deformation and uplift: a superplume-related event?,** *Geology,* June 1995, 23(6), p.491-494, 47 refs.

Evidence of short-lived episodes of mid-Cretaceous deformation, metamorphism, uplift, and hiatus in sedimentation is widespread in the Lower Cretaceous rocks that bordered the Cretaceous Pacific basin. The author presents a model in which these coeval but widely spaced events are linked to increased ridge-push force at subduction zones triggered by large-scale upwelling of mantle associated with the mid-Cretaceous superplume. This model can account for mid-Cretaceous terrane accretion and ophiolite obduction events and can explain brief compressional phases in predominantly extensional orogenies, as recognized in Alaska, British Columbia, California, western South America, and West Antarctica. (Auth.)

E-53676

Bryan, J.R, **Antarctic Marine Geology Research Facility, 1992-1993,** *Antarctic journal of the United States,* 1993, 28(5), p.334-335, 10 refs.

The project year (June 1, 1992 to May 31, 1993) was an exceptionally busy time at the National Science Foundation's Antarctic Marine Geology Research Facility (AMGRF) at Florida State University. In addition to the normal activities of sample distribution and sediment description, AMGRF has received two new core shipments (including the first material from the R/V *Nathaniel B. Palmer),* produced several new publications, and hosted a workshop on Antarctic Glacial-Marine and Biogenic Sedimentation. These activities are summarized.

E-53689

Galli, E., Quartieri, S., Vezzalini, G., Alberti, A., **Boggsite and tschernichite-type zeolites from Mt. Adamson, northern Victoria Land (Antarctica),** *European journal of mineralogy,* July-Aug. 1995, 7(4), p.1029-1032, 10 refs.

Two very rare zeolites, boggsite and a tschernichite-type mineral, have been found in the basalts of Mt. Adamson. Boggsite from Antarctica is chemically characterized by a high Na content in comparison with that of the type locality of Goble, Oregon. Tschernichite-type zeolite is both morphologically and chemically quite similar to tschernichite from Goble, but differences in X-ray powder diffraction patterns suggest that the minerals from the two localities have structures which can be described with different polytypic sequences. (Auth.)

E-53696

Zhao, Y., **Analysis of the origin of $CaCO_3$ in soils on Fildes Peninsula of King George Island, Antarctica,** *Chinese science bulletin,* July 1995, 40(13), p.1120-1124, 7 refs.

The question whether the soil-forming processes include calcification or decalcification in the Antarctic Peninsula and its adjacent islands is considered. Everett (1976) reported that carbonate in soils derived from limestone in the South Shetland Is., but Bockheim (1990) considered that carbonation is maximized in the region. There are no published data reporting $CaCO_3$ content of soils in Fildes Peninsula. Based on the results of soil survey and tests in the area, this note shows the $CaCO_3$ origin of the present soils, and discusses the relationship between the transference of $CaCO_3$ and the soil-forming environment. (Auth.)

E-53699

Motoyoshi, Y., Shiraishi, K., **Quantitative chemical analyses of rocks with X-ray fluorescence analyzer: (1) Major elements,** *Antarctic record,* Mar. 1995, 39(1), p.40-48, In Japanese with English summary. 3 refs.

Analytical procedures for major elements in rocks (Si, Ti, Al, Fe, Mn, Mg, Ca, Na, K, P), using a newly installed X-ray fluorescence analyzer (RIGAKU RIX3000), are summarized. The calibration curve method, the matrix correction method, and the fundamental parameter method are compared with respect to accuracy. By combining these methods, rocks with normal compositions, excluding ultramafic rocks, carbonate rocks and extremely quartz-rich rocks, can be quantitatively analyzed accurately. (Auth.)

E-53706

Marshall, C.R., **Distinguishing between sudden and gradual extinctions in the fossil record: predicting the position of the Cretaceous-Tertiary iridium anomaly using the ammonite fossil record on Seymour Island, Antarctica,** *Geology,* Aug. 1995, 23(8), p.731-734, 13 refs.

Analysis of the fossil ammonites on Seymour I. shows that their pattern of disappearances is consistent with a sudden mass extinction at the Cretaceous-Tertiary (K-T) boundary, even though a literal reading of the fossil record shows they disappeared gradually over a stratigraphic interval 10-50 m below the boundary. It is striking that the iridium anomaly on Seymour I. falls within the stratigraphic interval determined by the 50% confidence intervals to be the most likely place for the K-T boundary (assuming there was a sudden disappearance of ammonites at the boundary). However, a computer simulation of the Seymour I. ammonite fossil record indicates a wide range of another extinction scenarios, including gradual extinctions ranging over as much as 20 m (α=0.05), that are consistent with the ammonite fossil record. Without saturation collecting near the K-T boundary it will be impossible to distinguish between gradual and sudden extinction scenarios for the Seymour I. ammonites based on the ammonite fossil record alone. (Auth. mod.)

E-53707

Bockheim, J.G., **Permafrost distribution in the southern circumpolar region and its relation to the environment: a review and recommendations for further research,** *Permafrost and periglacial processes,* Jan.-Mar. 1995, 6(1), p.27-45, With French summary. Refs. p.40-45.

Permafrost is pervasive in ice-free areas of Antarctica and its offshore islands but is lacking in the subantarctic islands, except possibly at the higher elevations. Based on limited data, the thickness of permafrost ranges from 100 to 1000 m in ice-free areas of Antarctica. The thickness of the active layer ranges between 50 and 150 cm in the antarctic islands and maritime East Antarctica and 15 to 50 cm in interior Antarctica. Ground ice is restricted to rock glaciers and ice wedges; the rock glaciers, palsa and thermokarst reported in some areas originate from ice-cored drift and not permafrost. Active and inactive patterned ground occurs throughout the region. Whereas sorted circles, nets, and stripes are common in the antarctic islands and in maritime East Antarctica, ice- and sand-wedge polygons are prevalent in ice-free valleys of Antarctica. Altiplanation terraces may exist in the antarctic islands and in maritime East Antarctica; however, landforms in interior Antarctica are controlled more by salt weathering than by cryogenic processes. (Auth. mod.)

E-53713

Del Fueyo, G.M., Taylor, E.L., Taylor, T.N., Cúneo, N.R., **Triassic wood from the Gordon Valley, central Transantarctic Mountains, Antarctica,** *IAWA journal,* 1995, 16(2), p.111-126, Refs. p.124-126.

Wood from an *in situ* permineralized forest from the Middle Triassic of Gordon Valley is described as a new taxon. Approximately 100 trunks in growth position are present at the site; they range from 13-61 cm in diameter and suggest that some of the trees were up to 20 m tall. Pits in the radial walls of the tracheids are of the abietinean type. Rays are uniseriate and 1-9 cells high; cross fields include one to two pits that appear to be simple. Axial parenchyma is absent. Pith and cortex are not preserved. The antarctic wood is compared with existing fossil wood types from Antarctica and other parts of Gondwana. Although the fossil wood shares a number of characteristics with the Podocarpaceae, it differs from any existing genera and is described as a new taxon, *Jeffersonioxylon gordonense.* (Auth.)

E-53718

Leat, P.T., Scarrow, J.H., Millar, I.L., **On the Antarctic Peninsula batholith,** *Geological magazine,* July 1995, 132(4), p.399-412, 103 refs.

The plutonic rocks of the Antarctic Peninsula magmatic arc form one of the major batholiths of the circum-Pacific rim. The Antarctic Peninsula batholith is a 1350 km long by <210 km wide structure which was emplaced over the period ca. 240 to 10 Ma. In a northern zone of the Antarctic Peninsula, the batholith intrudes Palaeozoic-Mesozoic low-grade meta-sedimentary rocks, and in a central zone it intrudes schists and ortho- and paragneisses which have Late Proterozoic Nd model ages and were deformed during Triassic to Early Jurassic compression. In a southern zone the oldest exposed rocks are Permian sedimentary rocks and deformed Jurassic volcanic and sedimentary rocks. All these pre-batholith rocks formed a belt of relatively immature crust along the Gondwana margin. With few exceptions, Jurassic plutons crop out only within the central zone. They are considered to consist largely of partial melts of upper crust schists and gneisses and components of mafic magmas that caused the partial fusion. By contrast, Early Cretaceous plutons crop out along the length of the batholith. Few magma compositions appear to have been affected by upper crust, the bulk being compositionally independent of the type of country rock they intrude. (Auth. mod.)

E-53723

Ebihara, M., Ozaki, H., **Re, Os and Ir in antarctic unequilibrated ordinary chondrites and implications for the solar system abundance of Re,** *Geophysical research letters,* Aug. 15, 1995, 22(16), p.2167-2170, 15 refs.

The concentrations of Re, Os and Ir in antarctic unequilibrated ordinary chondrites (UOC) were determined by radiochemical neutron activation analysis. Large fractionations among these elements were found in antarctic UOC. This is quite different from non-antarctic UOC and equilibrated ordinary chondrites (EOC). It is suggested that Re is fractionated among ordinary and carbonaceous chondrites. Atom abundances of Os and Ir relative to 10^6 Si atoms of H chondrites are nearly equal to those of C1 chondrites, but their Re value is 30% higher than the C1 value. Since the currently accepted value for solar system abundance of Re is the lowest value among Re abundances in C1, C2, C3 and H chondrites, it should be changed to a larger value. If C2 chondrites are adopted as the solar system standard, the solar system abundance of Re is changed to 0.0589, with those of Os and Ir being 0.740 and 0.685, respectively, at the same time. (Auth. mod.)

E-53727

Baturin, G.N., **Element composition of the cobalt-bearing crusts of the Pacific Ocean,** *Oceanology,* 1990 (Pub. June 1991), 30(6), p.696-706, Translated from Okeanologiia. 46 refs.

DLC GC1.O3913

On the basis of the literature data and original material, this paper generalizes the information on the contents of 58 major and minor elements, including ore, non-ore, rare, and dispersed elements and both rare-earth and precious metals, in the hydrogenic ferromanganese crusts of the Pacific Ocean. The average contents of the elements in the ferromanganese crusts, nodules, and ocean water are compared, and the coefficients of the concentrations of various elements in them are computed and systematized. The possible reasons for the similar and dissimilar behavior of the ore metals in the different forms of the ferromanganese ore process on the ocean floor are discussed. Areas covered include Macquarie Ridge and Drake Strait. (Auth.)

E-53733

Sugiura, N., Zashu, S., **Nitrogen isotopic composition of CK chondrites,** *Meteoritics,* July 1995, 30(4), p.430-435, 29 refs.

Nitrogen abundances and isotopic compositions of four CK chondrites (ALH85002, EET92002, Yamato6903 and Karoonda) were measured by a stepped-combustion method. Neon and Ar were also measured for the same samples. Two types of isotopically light N were observed. One of them is labile N released at low temperatures (ca. 300°C). This N is observed only in ALH85002. The other N is extracted at high temperatures (900-1200°C) from all CK chondrites, although the isotopic compositions vary somewhat. There is a fair correlation between the excess ^{15}N values and the abundance of trapped ^{36}Ar for the high-temperature component, suggesting a presolar origin of these species. The light N ($\delta^{15}N = -106.8$ per mill) observed in Karoonda is one of the lightest N components ever reported for bulk chondrites. (Auth.)

E-53734

Dreibus, G., Palme, H., Spettel, B., Zipfel, J., Wänke, H., **Sulfur and selenium in chondritic meteorites,** *Meteoritics,* July 1995, 30(4), p.439-445, 55 refs.

Reported here are new analyses of S and Se in carbonaceous chondrites, 2 rumurutiites, ordinary chondrites, 3 anomalous chondrites, 3 acapulcoites, 3 lodranites, and in silicate inclusions of the Landes IAB iron meteorite. To avoid problems from inhomogeneous distribution of sulfides, the same samples that had been analyzed for Se by INAA were analyzed for S using a Leybold Heraeus Carbon and Sulfur Analyser (CSA 2002). Among the 50 analyzed meteorites, 24 were finds from hot (Australia, Africa) and cold (Antarctica) deserts. Weathering effects in the carbonaceous chondrites and in one lodranite from the hot deserts resulted in losses of S, Se, Na and occasionally Ni. Sulfur is apparently more affected by weathering than Se. No losses were observed in ordinary chondrite finds and in meteorites collected in Antarctica except for the obvious loss of Na in the CM-chondrite Y74662. The low S-content of 0.096% in Gibson, a lodranite, is probably not representative of this group of meteorites. Gibson is a find from the Australian desert and has lost S and also Se by weathering. Two other lodranites, finds from Antarctica, have about 2% S. (Auth.)

E-53740

Cande, S.C., Raymond, C.A., Stock, J., Haxby, W.F., **Geophysics of the Pitman fracture zone and Pacific-Antarctic Plate motions during the Cenozoic,** *Science,* Nov. 10, 1995, 270(5238), p.947-953, 59 refs.

Multibeam bathymetry and magnetometer data from the Pitman fracture zone (FZ) permit construction of a plate motion history for the South Pacific over the past 65 million years. Reconstructions show that motion between the Antarctic and Bellingshausen plates was smaller than previously hypothesized and ended earlier, at chron C27 (61 mya). The fixed hot-spot hypothesis and published paleomagnetic data require additional motion elsewhere during the early Tertiary, either between East Antarctica and West Antarctica or between the North and South Pacific. A plate reorganization at chron C27 initiated the Pitman FZ and may have been responsible for the other right-stepping fracture zones along the ridge. An abrupt (8°) clockwise rotation in the abyssal hill fabric along the Pitman flowline near the young end of chron C3a (5.9 mya) places the major change in Pacific-Antarctic relative motion in the late Neogene. (Auth.)

E-53742

Carrington, D.P., Watt, G.R., **Geochemical and experimental study of the role of K-feldspar during water-undersaturated melting of metapelites,** *Chemical geology,* May 1995, 122(1-4), p.59-76, 75 refs.

The production of S-type granites has been related to the extraction of melts from the lower continental crust. The rare-earth element geochemistry of lower crustal granulites and associated melts will depend on the behavior of the phases in which REE and trace elements are concentrated. New experimental data on synthetic metapelites show that K-feldspar can be a product for a reactant during water-undersaturated melting of biotite, depending on the H_2O/K_2O of the melt relative to biotite. The leucosomes formed in some antarctic granulite-facies migmatites are likely to have had low H_2O/K_2O ratios, which suggests that K-feldspar would have been a reactant during melting. This could cause the positive Eu anomalies observed in the leucosomes, through the disequilibrium melting of K-feldspar during water-undersaturated melting. The undersaturation of trace elements and REE in the leucosomes strongly suggests that disequilibrium melting took place, caused by the incomplete dissolution of accessory phases, monazite and zircon. These phenomena give the melts a distinctive geochemical character which has also been seen in the other granulite-facies leucosomes analyzed to date. (Auth. mod.)

E-53814

Beyer, L., Sorge, C., Blume, H.P., Schulten, H.R., **Soil organic matter composition and transformation in gelic histosols of coastal continental Antarctica,** *Soil biology & biochemistry,* Oct. 1995, 27(10), p.1279-1288, Refs. p.1287-1288.

Soil organic matter (SOM) of two antarctic soils was studied with special emphasis on soil formation processes under extreme climate conditions. An integrated approach of modern analytical methods, including wet-chemical analyses, cross-polarization magic-angle spinning carbon-13 nuclear magnetic resonance spectroscopy (CPMAS ^{13}C-NMR) and pyrolysis-field ionization mass spectrometry (Py-FIMS), was applied to characterize the SOM composition at different depths in a terri-gelic histosol and a fibri-gelic histosol. Corresponding to the brownish-black color of deeper soil horizons in the terri-gelic histosol formed by mosses, wet-chemical analyses indicated transformation processes in the profile. Relative to the LH-horizon, the deeper horizons were characterized by an enrichment of organic-C and non-α-NH_2-N. However, in the fibri-gelic histosol, wet-chemical analyses did not show changes of SOM composition with increasing profile depth, which is clearly in accordance with the greenish-grey color of all soil horizons. (Auth. mod.)

E-53815

Jull, A.J.T., Donahue, D.J., Burr, G.S., **Cosmogenic C-14 in antarctic and non-antarctic meteorites and lunar samples,** *U.S. National Aeronautics and Space Administration. Final technical report,* May 1994, NASA-CR-195795, 4p., N94-29905, Publications and abstract references p.2-4.

The authors were able to develop measurements of C-14 in meteorites as a useful tool for estimates of terrestrial age. Prior to this accomplishment, only a few measurements of C-14 terrestrial ages had been made. The sample sizes were larger, and there had been no systematic study of the various parameters affecting production of C-14, such as depth dependence, and the production cross sections for C-14 from spallation amounted to a few data points. Presently, C-14 ages are an accepted terrestrial age estimate in the meteorite community, whereas before this work the few data available were difficult to interpret. The authors have obtained terrestrial ages not only on groups of meteorites from different geographic areas but also information on unique meteorites from particularly interesting groups, such as meteorites originating from the Moon, or SNC meteorites, which many researchers believe are derived from Mars. (Auth.)

E-53818

Meiklejohn, K.I., **Valley asymmetry on south-eastern Alexander Island, Antarctica, and valley forms in the high Drakensberg, southern Africa,** *South African geographical journal,* Sep. 1994, 76(2), p.68-72, Refs. p.71-72.

Field data from southeastern Alexander I. are used to develop a model for the formation of asymmetrical valley-side slopes. Enhanced weathering and transport causes reduction in the gradient of north-facing slopes. Conversely, the relatively inactive south-facing slopes maintain their steep gradients. The application of this model to formation of the observed asymmetry in the high altitude regions of the Drakenberg mountains during the Pleistocene is considered. It is proposed that enhanced weathering and transport reduces the gradient of north-facing slopes whereas the south-facing slopes remain relatively protected environments. (Auth.)

E-53829

Crame, J.A., Kelly, S.R.A., **Composition and distribution of the inoceramid bivalve genus *Anopaea*,** *Paleontology,* May 1995, Vol.38, Part 1, p.87-103, 43 refs.

Anopaea is a distinctive Late Jurassic-Early Cretaceous inoceramid bivalve genus. Traditionally recognized by its elongate-pyriform outline and impressed antero-ventral sulcus, it is now apparent that it also has a distinctive hingeline. In each valve the thickened shell material of the hinge region terminates in a prominent fold, the anterior buttress; this often takes on the appearance of a small anterior 'ear'. Some fifteen taxa are now assigned to the genus and a further seven are probable members. The bulk of these forms falls within the Late Tithonian-Early Albian. *A. callistoensis* sp. nov., from the Late Tithonian-?Early Berriasian of the Antarctic Peninsula, and a probable new species from the Berriasian of the South Shetland Is., are described. *Inoceramus constrictus,* from the Early Albian of Queensland, Australia can now be referred to the genus. It can be confirmed that, with only a small number of exceptions, *Anopaea* was restricted to Late Jurassic-Early Cretaceous extra-Tethyan localities. In this sense it may be regarded as a genuine bipolar taxon, although amphitropical is perhaps a more accurate term. (Auth.)

E-53861

Jin, Q.M., et al, **Volcanism and magmatic evolution of Fildes Peninsula, Antarctica** [Nanji Feierdesi Bandao huoshan zuoyong ji yanjiang yanhua], Nanjing, Jiangsu kexue jishu chubanshe (Jiangsu Science and Technology Publishing House), 1992, 101p. + 98p., In Chinese with English version separately paged. Refs. 5p.

DLC QE524.N36 1992 Orien China

The volcanic rocks of Fildes Peninsula are identified as representative of the Antarctic Peninsula magmatic arc, mainly of the Early Tertiary. They are predominantly high-Al calc-alkaline basalts evolved from tholeiites and include some andesites and dacites. It is concluded that they evolved during eruptive intervals in a volcanic cycle with two subcycles consisting of four members, Jasper Hill, Agate Beach, Fossil Hill, and Block Hill. The first subcycle, corresponding to the Paleocene, consists of the Jasper Hill Member and the Agate Beach Member, and the second subcycle corresponding to the Eocene and Oligocene consists of the Fossil Hill Member and Block Hill Member respectively. The rock-forming minerals include plagioclase, pyroxene and olivine, and indicate extensive fractional crystallization after repeated periods of melting and remelting.

E-53862

Jin, Q.M., Qiu, J.R., Kuang, F.X., **Geological characteristics of Vinson Massif in the Ellsworth Mountains, Antarctica** [Nanji Aiersiwosi Shanmo Wensenfeng diqu dizhi tezheng], Nanjing, Jiangsu kexue jishu chubanshe (Jiangsu Science and Technology Publishing House), 1992, 27p. + 34p., In Chinese with English version separately paged. 21 refs.

DLC QE350.C46 1992 Orien China

The rock sequence in Vinson Massif is mainly composed of low metamorphic rocks. They consist of sandstone, silty pelite, conglomerate and marble, but sandstone is predominant, and can be further divided into five lithological members. Garnet is very common in the quartz sandstone. Vinson Massif Formation can be compared to the lower part of the Crashsite Quartzsite. The age of the Vinson Massif Formation is suggested to be Devonian. Sedimentary structure, clay minerals, trace elements and REE show that this formation was formed in a neritic and littoral facies. Iron ore deposits consisting of multi-layered hermatite develop in the first lithological member—the basal part of Vinson Massif Formation. The country rocks are banded iron-bearing garnet quartz sandstone. The iron ore beds are conformable with the country rocks; both of them suffered regional metamorphism and were synchronously folded. The iron-bearing series extended along the direction of anticlinal axis. (Auth. mod.)

E-53863

Li, Z.N., Zheng, X.S., Liu, X.H., Shang, R.X., Jin, Q.M., Wang, B.X., **Volcanic rocks of the Fildes Peninsula, King George Island, West Antarctica** [Xi Nanji Jiaozhiwang Dao Feierdesi Bandao huoshan yan], Beijing, Kexue chubanshe (Science Press), 1992, 227p., In Chinese with English version separately paged. Refs. p.219-224.

DLC QE461.H746 1992 Orien China

The results of three field studies in the summers of 1984-1987 of the volcanic rocks of Fildes Peninsula are presented. Two formations of five members in ascending order, representing two phases of volcanism, were identified: the Geographers Cove Formation consisting of the Jasper Hill and Agate Beach members, corresponding to the Paleocene, and the Fossil Hill Formation consisting of the Fossil Hill, Block Hill, and Long Hill members, corresponding to the Eocene. The distribution of volcanic basement faults indicates a general trend in the eastward migration of volcanism. The basalts and andesites of Phase I and the andesites and dacites of Phase II show transitional features between typical island arc tholeiitic series and island arc calc-alkaline series. It is suggested that the different rock types are the products of magmatic differentiation.

E-53864

Dalziel, I.W.D., McMenamin, M.A.S., Young, G.M., **Are Neoproterozoic glacial deposits preserved on the margins of Laurentia related to the fragmentation of two supercontinents?: comment and reply,** *Geology,* Oct. 1995, 23(10), p.959-960, 13 refs. For paper under discussion see L-52223.

This paper addresses terminological variations in super-continent designation. In the subject paper the author favored the addition of an additional super-continent term to designate a second hypothetical super-continent. The objectors recommend the retention of the original name until the existence of the "second" super-continent can be more clearly verified.

E-53915

Elliot, D.H., ed, Blaisdell, G.L., ed, **Contributions to antarctic research IV,** *American Geophysical Union. Antarctic research series,* 1995, 67(4), 216p., Refs. passim. For individual papers see E-53918 through E-53922, G-53923, G-53924, G-53926, F-53925, K-53917, L-53916 or 50-1191 through 50-1195.

DLC G845.C67 vol.67, no.4, 1995

This volume focuses primarily on the geomagnetic activity, mineralogy, and petrology in various parts of the Transantarctic Mountains, but includes as well the thermal, isotopic, and chemical features of Lake Vanda and Don Juan Pond. Additional foci are concerned with the construction and maintenance of snow runways in Antarctica, an experimental permanent runway near McMurdo Station, and the logistics involved with the delivery of fuel and construction materials for rebuilding Amundsen-Scott Station while continuing to service the needs of the ongoing science programs.

E-53918

Faure, G., Hagen, E.H., Johnson, K.S., Strobel, M.L., Whiting, K.S., **Geological exploration of East Antarctica: iron, manganese, and titanium in the heavy-mineral fractions of till in the Transantarctic Mountains,** *American Geophysical Union. Antarctic research series,* 1995, 67(4), Contributions to antarctic research IV, p.19-31, 39 refs.

DLC G845.C67 vol.67, no.4, 1995

Heavy-mineral fractions of till samples collected in the Transantarctic Mountains have been analyzed for Fe, Mn, and Ti as a first step toward constraining the geology of their subglacial bedrock sources. The concentrations of Fe, Mn, and Ti in the heavy-mineral fractions of till in the Allan Hills, on Shapeless Mountain, and in the Wisconsin Range have anomalously high concentrations of Fe, Mn, and Ti. These occurrences suggest the presence of Fe-Ti-Mn oxide minerals which may have originated from distinctive bedrock sources in the ice-drainage basins associated with these two areas. The heavy-mineral fractions of till from the Allan Hills and Shapeless Mountain contain sphene and rutile grains with minor concentrations of ilmenite and magnetite and may have been derived from granitic source rocks of igneous or metamorphic origin. (Auth. mod.)

E-53920

Friedman, I., Rafter, A., Smith, G.I., **Thermal, isotopic, and chemical study of Lake Vanda and Don Juan Pond, Antarctica,** *American Geophysical Union. Antarctic research series,* 1995, 67(4), Contributions to antarctic research IV, p.47-74, 75 refs.

DLC G845.C67 vol.67, no.4, 1995

A seven stage history is proposed for Lake Vanda. (1) A fiord formed in the deglaciated valley about 5+ Ma. (2) During subsequent uplift, some of the sea water trapped in Wright Valley was flushed out by glacial meltwater; further uplift blocked this drainage and isolated Wright Valley from the Ross Sea but some sea water was trapped. (3) During warm seasons, glacial meltwater flowed into the Wright Valley. Soluble salts slowly accumulated in the lake. Cooling of the summer climate reduced the influx of meltwater, inflow became less than evaporation, and the lake shrank, finally producing a $CaCl_2$-NaCl brine. Efflorescences on the flanks of the shrinking lake were blown away by winds, leaving a brine enriched in the more-soluble calcium chloride. (4) Crystals of Antarcticite formed and were enriched in ^{18}O but depleted in deuterium relative to the precursor brine. (5) Warmer summers 2600 years ago filled the basin to the high stand now documented by shorelines and lacustrine sediments. (6) Shortly thereafter, summers cooler than the present caused the lake either to shrink or to desiccate. (7) Another climatic warming about 1200 years ago filled the basin to its present level. This climatic episode was warmer than the present because the in-flow shows evidence of increased meltwater from valley glaciers. (Auth. mod.)

E-53921

Vennum, W.R., Rowley, P.D., Loudon, T.S., **Intrusive igneous rocks of eastern Ellsworth Land, West Antarctica: the southwestern extension of the Lassiter Coast intrusive suite,** *American Geophysical Union. Antarctic research series,* 1995, 67(4), Contributions to antarctic research IV, p.75-101, 58 refs.

DLC G845.C67 vol.67 no.4, 1995

About 25 small granitic stocks are exposed in eastern Ellsworth Land. These stocks intrude intertongued deformed Jurassic calc-alkaline volcanic rocks of the Mount Poster Formation and clastic sedimentary rocks of the Latady Formation. These plutonic rocks are predominantly granodiorite and granite, but range in composition from gabbro to granite. K-Ar and Rb-Sr isotopic ages of the plutons range from 128 to 101 Ma (Early Cretaceous). Many outcrops of granitic rock are cut by dikes, but in three localities dikes are truncated by plutons. Dikes range in composition from olivine-rich wehrlite to rhyolite, but most are basalt or andesite. Field relations, geochemistry, paleomagnetic data, and isotopic ages suggest that all dikes are Lower Cretaceous. Intrusion of two stocks was accompanied by late-stage, non-economic grade porphyry copper-type mineralization. Plutonic rocks of the study area represent a south and southwestward extension of the Lassiter Coast Intrusive Suite, along the eastern edge of the southern Antarctic Peninsula in the Lassiter and southern Black Coasts. (Auth. mod.)

E-53922

Elliot, D.H., Fleming, T.H., Haban, M.A., Siders, M.A., **Petrology and mineralogy of the Kirkpatrick basalt and Ferrar dolerite, Mesa Range region, north Victoria Land, Antarctica,** *American Geophysical Union. Antarctic research series,* 1995, 67(4), Contributions to antarctic research IV, p.102-141, 101 refs.

DLC G845.C67 vol.67, no.4, 1995

Jurassic tholeiites of the Ferrar Group form extensive outcrops of lava principally in the Mesa Range and nearby nunataks, and widely distributed sills adjacent to the Rennick Glacier. The lavas sequences are up to 780 m thick and consist of as many as 41 flows ranging in thickness between 1 and 135 m. The lavas contain two pyroxenes, plagioclase, and iron-titanium oxides in a glassy to microcrystalline devitrified matrix. The sills are similar petrographically to the coarser-grained doleritic lavas, and generally lack a glassy or devitrified matrix. The lavas and sills comprise two distinct geochemical types referred to as the Mount Fazio Chemical Type (MFCT) and the Scarab Peak Chemical Type (SPCT); the latter occurs only as the capping flow of the lava sequence. MFCT plagioclase compositions range from calcic bytownite to sodic labradorite, whereas the SPCT compositions are mainly labradorite. MFCT pyroxenes are predominantly augite and pigeonite; sparse orthopyroxene is also present. (Auth. mod.)

E-53943

Zheng, X.S., Sàbat, F., Casas, J.M., Pallàs, R., **Petrochemistry of the Mesozoic-Cenozoic volcanic rocks from the central part of Livingston Island, West Antarctica,** *Antarctic research (Chinese edition),* June 1995, 7(2), p.1-17, In Chinese with English summary. Refs. p.15-17.

Cretaceous volcanic rocks outcropped in the central part of Livingston I. consist of a basalt-basaltic andesite-andesite-dacite association, principally belonging to calc-alkaline series and characters of low potassium and low Mg. The rocks are rich in Rb, Th, Ba, and depleted Zr, Ti, Hf, Nb, Cr and Ni. The rocks are moderately enriched in light rare earth elements and show low $(Ce/Yb)_{cn}$ ratios; they were formed in an orogenic environment, part of the South Shetland magmatic arc. The volcanic rocks of the Mount Bowles Formation, mainly outcropped on central Livingston I. and Hannah Point, differ from the Mesozoic-Cenozoic volcanic rocks in other locations both in petrography and petrochemistry. Therefore, they have been considered as the products of a local magma system which was controlled by both the proto-Pacific plate subduction and the local tectonic setting. The olivine basalts from Cape Shirreff show high alkali and low silica contents, and usually high aluminum content. These features are very similar to the basalts in Byers Peninsula, where volcanic activities lasted from Late to Middle Cretaceous and produced a calc-alkaline series. Regionally, the volcanic activities continued and progressively migrated northeastwards, resulting in dolerite plugs and sills. (Auth. mod.)

E-53944

Zhao, Y., Li, T.J., **Analysis of the chemical weathering characteristics of soil-minerals on Fildes Peninsula of King George Island, Antarctica,** *Antarctic research (Chinese edition),* June 1995, 7(2), p.18-24, In Chinese with English summary. 9 refs.

From surveys carried out on Fildes Peninsula on the soil-forming environment and soil properties, this paper analyzes the clay constituent of the typical soils in the area and the content of major elements in the clay, silt and soils. The results show that the major secondary minerals are montmorillonite, illite and chlorite; the chemical weathering processes of the soil minerals include desalting, stagnant oxidation-reduction and very weak desilicification. (Auth.)

E-53946

Liao, W.H., **Outline of antarctic Devonian and its comparison with the Chinese Devonian,** *Antarctic research (Chinese edition),* June 1995, 7(2), p.32-37, In Chinese with English summary. 13 refs.

In Antarctica, Devonian rocks outcropped in the Transantarctic Mountains and accumulated mainly in two basins: the McMurdo basin and the Ohio Range to Ellsworth Mountains. Early Devonian littoral arenaceous sediments and Late Devonian alluvial plain depositions are distributed in South Victoria Land. A thin sequence of nearshore marine beds with a shelly Malvinokaffic Emsian fauna occurred in the Ohio Range. The Ellsworth basin lay between the epicontinental basin and the marginal magmatic arc during the Devonian. The Antarctic Devonian is compared with the Qujing type sequences in South China as well as with the Qilianshan type depositions in NW China. (Auth.)

E-53957

Pallàs, R., Vilaplana, J.M., Sàbat, F., **Geomorphological and neotectonic features of Hurd Peninsula, Livingston Island, South Shetland Islands,** *Antarctic science,* Dec. 1995, 7(4), p.395-406, Refs. p.405-406.

On Hurd Peninsula neotectonic features such as faults affect the landforms and emerged marine levels. A detailed local study of these features provides information on the recent structural and geomorphological evolution of the area. The authors suggest that Hurd Peninsula is divided into several tectonic blocks separated by faults. Movement of the faults determines the relative altitude of these blocks and, in consequence, their susceptibility to glacial, periglacial, or marine processes. Although some of the tectonic movements reflected in the landforms may have been inherited from former phases of deformation, some of the neotectonic faulting has a maximum Lower Miocene age. A new method of correlation of emerged beach levels is suggested and the possibility of analyzing the effects of neotectonic deformations from their analysis is discussed. The application of the methods tested here to other areas of the South Shetland archipelago could provide insights into the timing and mechanisms of recent tectonic evolution. (Auth.)

E-53958

Vizcaíno, S.F., Scillato-Yané, G.J., **Eocene tardigrade (Mammalia, Xenarthra) from Seymour Island, West Antarctica,** *Antarctic science,* Dec. 1995, 7(4), p.407-408, 17 refs.

The discovery of a tooth from a member of the Tardigrada (Family *incertae sedis),* confirming the presence of this group in the Eocene of Antarctica, is reported. The tooth was recovered during the 1993-94 austral summer from the surface of the first *Cucullaea* shell bed of La Meseta Formation. The tooth is an incomplete upper caniniform lacking its base. The following measurements are therefore partial: apicobasal height=19.70 mm; mesiodistal length=6.45 mm; maximum bucholingual width=8.55 mm. The pulp cavity is wide, conical, and open-rooted (hypselodont). Distally the crown bears a slightly concave wear facet. Although the sparse material precludes histological study, the tooth clearly lacks enamel. It is formed of three layers of dentine: a hard external layer is separated from a softer central part by a thinner and clearer layer. Among Mammalia, hypselodont caniniforms lacking enamel are known only from the Superorder Xenarthra. Because of the close biogeographical relationship between Patagonia and the Antarctic Peninsula, the specimen was compared with the teeth of diverse South American marsupials and ungulates, but without success. (Auth. mod.)

E-53968

Fournier, H.G., **Geophysical studies of the Antarctic Peninsula,** *Acta geodaetica et geophysica Hungarica,* 1994, 29(1-2), p.19-38, 36 refs.

An account is given of the procedures followed and criticism of their use to obtain an acceptable synthesis of results from six campaigns on the Antarctic Peninsula using four geophysical methods: magnetotelluric, audiomagnetotelluric, electric, and seismic soundings, from 1979-1992. Using results from a total of 115 soundings made in an area 200 km in diameter at the NE end of the Antarctic Peninsula, the author describes 1) the permafrost; 2) the brine layer below the permafrost; 3) the contact between the Lower and Upper Cretaceous; 4) the sedimentary basement; and (5) the top of the intermediate conductive layer (ICL). (Auth. mod.)

E-53971

Braun, H.M., **Structural investigations in Proterozoic to Lower Palaeozoic rocks in the Read Mountains and Haskard Highlands of the Shackleton Range, Antarctica,** *Polarforschung,* 1995(Pub. 1993), 63(2/3), p.63-99, With German summary. 65 refs.

Studies on macroscopic rock deformation and microfabrics of the basement rocks of the Shackleton Range confirm two major tectonometamorphic events. During the mid-Proterozoic, the basement was affected by prograde metamorphism reaching at least amphibolite facies conditions, and syn-metamorphic ductile deformation. In several outcrops in the Read Mountains relations among deformation, metamorphism, and intrusive activity are reconstructed in detail. Proterozoic tectonometamorphism terminated with uplift and erosion of the basement, followed by deposition of the Eocambrian Watts Needle Formation, a thin sequence of epicratonic sediments. Information about the early history of basement rocks in the Haskard Highlands is not as detailed, but a major tectonometamorphic event during the mid-Proterozoic can be demonstrated as well. (Auth. mod.)

E-53972

Spaeth, G., Hotten, R., Peters, M., Techmer, K., **Mafic dykes in the Shackleton Range, Antarctica,** *Polarforschung,* 1995(Pub. 1993), 63(2/3), p.101-121, With German summary. 33 refs.

In addition to some mafic dykes which are already known and which were resampled, a number of mafic dykes were discovered in the Shackleton Range during the 1987-88 GEISHA expedition and sampled for the first time. Field data for 29 dykes, as well as analytical results of petrographic, geochemical, and isotope-geochemistry studies on the basalts of 26 of these dykes, are presented and discussed. On the basis of radiometric dating and field relationships, the following ages can be assigned to the five groups of dykes: Group I, Early Jurassic; Groups II and III, early Palaeozoic (Middle Devonian to Late Ordovician?); Group IV, probably Late Proterozoic and Group V, probably Middle Proterozoic. The groups of mafic dykes are discussed with respect to the geotectonic history of the Shackleton Range, and comparisons with neighboring regions are made. (Auth. mod.)

E-53974

Schubert, W., Olesch, M., **Cordierite in the Shackleton Range, Antarctica: first recorded occurrence,** *Polarforschung,* 1995(Pub. 1993), 63(2/3), p.153-164, With German summary. 40 refs.

The cordierite-bearing rocks in the Shackleton Range constitute the more melanosomic portions of the metatectic and migmatitic rocks that are associated with relict granulite facies rocks such as enderbitic granulite and enderbitic garnet granulite. The predominant mineral assemblage in the cordierite-bearing rocks includes chemically homogeneous cordierite and biotite, strongly zoned garnet, sillimanite, K-feldspar, plagioclase, and quartz. Inclusions of sillimanite and biotite relics in both garnet and cordierite indicate that garnet and cordierite were produced by the coupled discontinuous reaction: biotite + sillimanite + quartz=cordierite + garnet + K-feldspar + H_2. Various garnet-biotite and garnet-cordierite geothermometers and sillimanite-quartz-plagioclase-garnet-cordierite geobarometers yield a continuous clockwise path in the P-T diagram. The P-T conditions for equilibrium between garnet core and cordierite and between garnet core and biotite during peak metamorphism and migmatization were estimated to be 690°C at 5-6 kb. This was followed by cooling and unloading with continuously changing conditions down to 515°C at 2-3 kb. (Auth. mod.)

E-53975

Roland, N.W., Olesch, M., Schubert, W., **Petrogenesis of the metasediments from the Pioneers Escarpment, Shackleton Range, Antarctica,** *Polarforschung,* 1995(Pub. 1993), 63(2/3), p.165-182, With German summary. 38 refs.

During the GEISHA expedition, the Pioneers Escarpment was visited and sampled extensively for the first time. Most of the rock types encountered represent amphibolite facies metamorphics, but evidence for granulite facies conditions was found in cores of garnet. These conditions must have been at least partly reached during the peak of metamorphism. For the Pioneers Escarpment a varicolored succession of sedimentary and bimodal volcanic origin is typical. These rocks are considered to be a supracrustal unit called the Pioneers Group. In the easternmost parts of the Pioneers Escarpment, e.g. at Vindberget, nonmetmorphic shales, sandstones and greywackes crop out, which are cover rocks of possibly Jurassic age. These metasediments indicate that deposition took place on the submerged rim of a craton. Marine shallow-water sedimentation including marls and aluminous clays form the protoliths. The volcanics may be part of a bimodal volcanics-arkose-conglomerate (BVAC) association. Geochemical analyses support the assumption of volcanic protoliths. (Auth. mod.)

E-53976

Höfle, H.C., Buggisch, W., **Glacial geology and petrography of erratics in the Shackleton Range, Antarctica,** *Polarforschung,* 1995(Pub. 1993), 63(2/3), p.183-201, With German summary. 17 refs.

Evidence that the entire Shackleton Range was once overrun by ice from a southerly to southeasterly direction has been provided by subglacial erosional forms (e.g. striations, crescentic gouges, roches moutonnées) and erratics which probably originated in the region of the Whichaway Nunataks and the Pensacola Mountains in the southern part of the range. This probably happened during the last major expansion of the antarctic polar ice sheet, which, on the basis of evidence from other parts of the continent, occurred towards the end of the Miocene. Till and an area of scattered erratics were mapped in the northwestern part of the range. These were deposited during a period of expansion of the Slessor Glacier in the Weichselian (Wisconsian) glacial stage earlier. This expansion was caused by blockage of the glacier by an expanded Filchner ice shelf which resulted from the sinking of the sea level during the Pleistocene, as demonstrated by geological studies in the Weddell Sea and along the coast of the Ross Sea. (Auth. mod.)

E-53982

Peacock, S.M., Goodge, J.W., **Eclogite-facies metamorphism preserved in tectonic blocks from a lower crustal shear zone, central Transantarctic Mountains, Antarctica,** *Lithos,* Aug. 1995, 36(1), p.1-13, Refs. p.12-13.

In the Geologists and Miller Ranges of the central Transantarctic Mountains, mafic and ultramafic tectonic blocks occur in an Early Cambrian amphibolite- to granulite-facies lower crustal transpressional shear zone. Mafic blocks consist of garnet + clinopyroxene symplectite + hornblende + plagioclase + quartz + ilmenite±orthopyroxene±biotite. Mineral compositions in these blocks generally reflect equilibration under upper amphibolite to lower granulite facies conditions. The conditions are the same as those indicated by peak, syn-kinematic assemblages in the enclosing shear zone tectonites. Mineral and textural evidence for an earlier higher-pressure eclogite-facies metamorphism includes: plagioclase reaction rims around anhedral garnet; complex clinopyroxene intergrowths consisting of augite + plagioclase + quartz±hornblende±orthopyroxene, interpreted as exsolved Na-rich clinopyroxene (omphacite); and unusual magnesian staurolite inclusions in pyrope-almandine garnet. It is suggested that the relict eclogite-facies metamorphism records an earlier period of crustal thickening that occurred prior to formation of the transpressional shear zone, perhaps as an early stage in the Ross orogenesis. (Auth.)

E-54001

Wolf, S.F., Lipschutz, M.E., **Chemical studies of H chondrites-7. Content of Fe^{3+} and labile trace elements in antarctic samples,** *Meteoritics,* Nov. 1995, 30(6), p.621-624, 15 refs.

Linear discriminant analysis and logistic regression have been applied to concentration data for 10 labile trace elements (Rb, Ag, Se, Cs, Te, Zn, Cd, Bi, Tl and In) in 33 antarctic H4-6 chondrites. The proportion of bulk Fe in the Fe^{3+} state, Fe^{3+}/Fe, of these same chondrites permit their assignment to less- and more-weathered suites. Wherever the division between these suites is placed, the results are identical and consistent with the null hypothesis that the suites sample a single preterrestrial compositional population. Hence, no evidence exists that preterrestrial contents of labile trace elements in antarctic H4-6 chondrites have been significantly altered by weathering as quantified by Fe^{3+}/Fe or the A-B-C weathering index. (Auth.)

E-54002

Burns, R.G., Burbine, T.H., Fisher, D.S., Binzel, R.P., **Weathering in antarctic H and CR chondrites: quantitative analysis through Mössbauer spectroscopy,** *Meteoritics,* Nov. 1995, 30(6), p.625-633, 41 refs.

Mössbauer spectroscopic measurements were made of 33 antarctic H chondrites (predominantly H5) and two paired antarctic CR chondrites. The primary goals of this study are to determine if Mössbauer spectroscopy can be used to determine which phases are weathering in antarctic meteorites and if the relative amounts of ferric iron correlate with terrestrial age. Determining which minerals are weathering in ordinary chondrites appears very difficult due to variations in composition for different ordinary chondrites of the same meteorite class and possible problems in preparing homogeneous samples. Analysis of the two paired CR chondrites appears to indicate that metallic iron is predominantly weathering to produce ferric iron for this class of meteorite. No correlation is seen between the relative amounts of ferric iron and terrestrial age for ordinary chondrites. (Auth. mod.)

E-54003

Nishiizumi, K., Arnold, J.R., Brownlee, D.E., Caffee, M.W., Finkel, R.C., Harvey, R.P., **Beryllium-10 and aluminum-26 in individual cosmic spherules from Antarctica,** *Meteoritics,* Nov. 1995, 30(6), p.728-732, 28 refs.

Data are presented for the cosmogenic nuclides ^{10}Be and ^{26}Al in a suite of 24 extraterrestrial spherules, collected from antarctic moraines and deep sea sediments. All 10 large spherules collected in glacial till at Lewis Cliff are extraterrestrial. As in earlier work, the great majority of particles show prominent solar cosmic-ray production of ^{26}Al, indicating bombardment ages on the order of 10^6 years or even longer. These long ages are in direct contradiction to model ages for small particles in the inner solar system and may require reconsideration of models of small particle lifetimes. A small fraction of the particles so far measured (6/42) possess cosmogenic radionuclide patterns consistent with predictions for meteoroid spall droplets. Presumably, most of the spherules were bombarded in space primarily as bodies not much larger than their present size. (Auth. mod.)

E-54009

Benoit, P.H., **Meteorites as surface exposure time markers on the blue ice fields of Antarctica: episodic ice flow in Victoria Land over the last 300,000 years,** *Quaternary science reviews,* June 1995, 14(5), p.531-540, 47 refs.

It is possible to estimate how long antarctic meteorites have been on Earth by using cosmogenic radionuclide abundances and how long they have been exposed on the ice surface using natural thermoluminescence (TL) levels. This paper discusses two methods to determine surface exposure ages for antarctic meteorite finds; one method assumes an initial TL level and average surface exposure temperature while the other method uses multiple samples from a single meteorite and assumes a temperature gradient across the meteorite. The former method does not work for approximately 15% of meteorites which were heated prior to Earth impact. These data suggest that no meteorite in the current study was exposed on the ice surface for more than 300,000 years, which may imply that the blue ice fields in question were not stable platforms prior to this point in time or that a rapid pulse in ice thickness cleared the field of meteorites. Steps in surface exposure ages suggest that accumulation of meteorites on the ice fields has been episodic over the last 300,000 years, although these episodes have been of lesser magnitude than that at about 300,000 years ago. (Auth. mod.)

E-54017

Janecek, T.R., ed, **Descriptions of sediment recovered by the R/V *Nathaniel B. Palmer,* United States Antarctic Program, cruise 8, 1993,** *Florida State University. Antarctic Marine Geology Research Facility. Contribution,* Oct. 1995, No.3, 65p., Refs. p.55-59.

This volume contains the descriptions of sediments recovered by the R/V *Nathaniel B. Palmer* during cruise 8 in 1993 to the eastern and central Ross Sea area (herein referred to as NBP93-8). During Dec. 1993 and Jan. 1994 the *Nathaniel B. Palmer* occupied 18 coring stations and collected several thousand kilometers of single- and multi-channel seismic data. A total of 14 piston cores, 10 trigger cores and 2 gravity cores were retrieved during the cruise. Included are a summary of the scientific objectives and preliminary results of cruise NBP93-8, a table and map of station locations, a discussion of core recovery and processing, an explanation of laboratory descriptive procedures, lithologic and smear-slide descriptions of piston, trigger, and gravity cores, and several appendices containing information on how to obtain samples from cores stored at the Antarctic Research Facility.

E-54018

Janecek, T.R., ed, **Descriptions of sediment recovered by the R/V *Nathaniel B. Palmer,* United States Antarctic Program, cruise 1, 1993,** *Florida State University. Antarctic Marine Geology Research Facility. Contribution,* Oct. 1995, No.2, 47p., Refs. p.37-41.

This volume contains the descriptions of sediments recovered by the R/V *Nathaniel B. Palmer* during its maiden coring cruise in 1993 (herein referred to as NBP93-1). During Feb. and Mar. 1993, the *Nathaniel B. Palmer* occupied 13 coring stations, 11 on the Larsen Ice Shelf and 2 in the Powell Basin. A total of 4 piston cores, 4 trigger cores, and 5 gravity cores were retrieved during the cruise. Included are a summary of the scientific objectives of cruise NBP93-01, a table and several maps of station locations, a discussion of core recovery and processing, an explanation of laboratory descriptive procedures, lithologic and smear slide descriptions of piston, trigger, and gravity cores, and several appendices containing sample request and sample distribution information.

E-54019

Janecek, T.R., ed, **Descriptions of sediment recovered by the R/V *Polar Duke,* United States Antarctic Program, cruise VI, 1988,** *Florida State University. Antarctic Marine Geology Research Facility. Contribution,* Oct. 1995, No.1, 61p., Refs. p.51-55.

This volume contains the descriptions of sediments recovered by the R/V *Polar Duke* during the 6th cruise of 1988 (herein referred to as PD88-VI). During May, 1988 the *Polar Duke* collected a total of 2480 nautical miles of digitally-recorded single-channel seismic data in the vicinity of the northern Antarctic Peninsula. Seventeen coring stations were occupied, primarily to recover cores for thermal conductivity measurements. A total of 10 piston cores, 10 trigger cores and 5 gravity cores were retrieved during the cruise. Included are a summary of the scientific objectives of cruise PD88-VI, a discussion of core recovery and processing, a table and several maps of station locations, an explanation of laboratory descriptive procedures, lithologic and smear-slide descriptions of piston, trigger, and gravity cores and bag samples, and several appendices containing information and forms for requesting sediment samples.

E-54031

Matzer, S., **Paleozoic accretion at the Paleopacific margin of Antarctica in North Victoria Land. P-T-D-history and deformation mechanisms in the Bowers Terrane** [Paläozoische Akkretion am paläopazifichen Kontinentalrand der Antarktis in Nordvictorialand - P-T-D-Geschichte und Deformationsmechanismen im Bowers Terrane], *Berichte zur Polarforschung,* 1995, No.173, 234p., In German with English summary. Refs. p.215-226.

DLC QE654.M335 1995

Northern Victoria Land forms the Pacific end of the Transantarctic Mountins and is built up of three NNE-SSW trending "terranes". The Wilson Terrane (WT) consists of high-grade metamorphics, schists and granitic intrusives. The middle Bowers Terrane (BT) and the eastern Robertson Bay Terrane (RBT) consist of very-low-grade metamorphic rocks. Accretion of BT and RBT to the active paleopacific margin of Antarctica, built up by the WT, as well as the metamorphism and the deformation within the three terranes, belong to the Ross-Orogeny in late

Cambrian to early Ordovician times. BT and RBT together form a terrane, and are abbreviated B/RBT. Details of these structures and their temporal alterations comprise the body of the work. (Auth. mod.)

E-54032
Bauer, W., **Structural evolution and petrogenesis of the metamorphic basement complex of the northern Heimefrontfjella (western Dronning Maud Land/Antarctica)** [Strukturentwicklung und Petrogenese des metamorphen Grundgebirges der nördlichen Heimefrontfjella (westliches Dronning Maud Land/Antarktika)], *Berichte zur Polarforschung,* 1995, No.171, 222p., In German with English summary. Refs. p.177-186.
DLC QE350.B35 1995

The northern Heimefrontfjella comprises a complex of amphibolite-facies metavolcanics, metasediments and numerous tabular metaplutonic rocks. Prior to the end of the Kibaran orogeny the metamorphic complex was locally intruded by granites, diorites and accompanying dykes. These intrusive rocks became weakly deformed during the latest stage of the Kibaran orogeny. According to zircon dating of a late Kibaran granite the orogeny ended c. 1,050 Ma. The region is characterized as a mainly Kibaran-deformed orogen. In the Gondwana reconstruction, the girdle of Kibaran age orogens in western Queen Maud Land closes the gap between the Namaqua-Natal belt and the Mozambique belt in southern Africa. Indications of a former connection between the Grenville belt of Laurentia and the Heimefrontfjella, sedimentary rocks of a Neoproterozoic "Mozambique Ocean", and subduction-related magmatites to prove the SWEAT hypothesis were not found in the Heimefrontfjella. (Auth. mod.)

See also:
A-52715 A-53513 B-51776 B-51778 B-51779
B-51780 B-51830 B-52082 B-52227 B-52366 B-52471
B-52541 B-52559 B-52602 B-52780 B-53012 B-53167
B-53169 B-53257 B-53266 B-53267 B-53268
B-53271 B-53583 B-53716 B-53725 B-53747 B-53880
B-53949 B-53963 C-51672 C-52130 C-53675
D-51860 D-54033 F-51743 F-51806 F-51807 F-51857
F-51864 F-51868 F-51888 F-52150 F-52281 F-52440
F-52608 F-52700 F-52790 F-52840 F-52898 F-52916
F-52931 F-52956 F-52978 F-53639 F-53659 F-53919
I-51977 I-51986 I-52041 I-52616 I-52623 I-53286
I-53367 I-53868 J-51815 J-52116 J-52412 J-52579
J-52622 J-52625 J-52844 J-53017 J-53146 J-53279
J-53280 J-53387 K-53940 K-54039 L-51667 L-51737
L-51746 L-51757 L-51758 L-51765 L-51781 L-51865
L-51926 L-51945 L-52018 L-52213 L-52214
L-52223 L-52224 L-52242 L-52243 L-52284
L-52431 L-52432 L-52433 L-52837 L-53026 L-53032
L-53080 L-53093 L-53139 L-53376 L-53378
L-53544 L-53545 L-53569 L-53630 L-53649
L-53735 L-53916 L-53973 L-53980

F. ICE & SNOW

F-51688

Wadhams, P., **Antarctic sea ice cover,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.45-59, 30 refs.

DLC G845.5.A54 1994

The presence of a sea ice cover has an enormous effect on the exchanges of heat, moisture and momentum between ocean and atmosphere. The motion of sea ice leads to water mass modification both in the region of generation (where fresh water is removed) and in the region of melt (where fresh water is injected into the ocean), which may be hundreds or thousands of kilometers away. Since antarctic sea ice and its huge seasonal cycle are of central importance to the climate and energy budgets of the southern ocean, it is vital to understand the mechanisms leading to ice formation, transport and melt. Some of the various conditions and processes associated with antarctic sea ice include: the pancake-frazil ice cycle; first- and multi-year ice; snow loading; pressure ridging; polynyas; interactions between climate change and sea ice; remote sensing of sea ice; sea ice and bottom water production; and sea ice and biology. (Auth. mod.)

F-51689

Spindler, M., Dieckmann, G.S., **Ecological significance of the sea ice biota,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.60-68, 25 refs.

DLC G845.5.A54 1994

The antarctic sea ice cover and biota associated with it play a key role in the marine ecosystems of the southern ocean. Due to the high biomass of autotrophic algae living at the ice/water interface and within the brine channel system of the sea ice, a large proportion of the total primary production in these regions can be attributed to these autotrophs. During winter the algae survive the harsh conditions of low temperatures, high salinities and low irradiance levels. It is during this time that they become an important food source for a number of pelagic animals, particularly the southern krill. During the ice melt, algae are released to the water column where they may contribute to the initiation of the phytoplankton spring bloom, while sedimentation of sea ice organisms provides the benthos with food. The above statements on the ecological role of sea ice biota are based on recent findings and are summarized. (Auth.)

F-51690

Oeschger, H., **Polar ice sheets: a chronicle of climate and environment,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.69-94, 34 refs.

DLC G845.5.A54 1994

A wealth of information is recorded in ocean and continental sediments, in geomorphological features, in peat bogs, tree-rings and in natural ice. In this paper the concentration is mainly on polar ice which can be regarded as a chronicle of the history of climate and environment. To date only a small portion of the available information has been retrieved. The main advances in global change science have come from the analysis of deep ice cores drilled in Greenland and Antarctica. A short overview on the present knowledge of anticipated climate change is given and questions are listed concerning information on Earth system history. Special emphasis is given to results from ice core studies. Finally, an outlook is presented based on important recent results from studies on newly drilled ice cores. (Auth. mod.)

F-51727

Wen, J.H., et al, **Climate, mass balance and glacial changes on small dome of Collins Ice Cap, King George Island, Antarctica,** *Antarctic research,* June 1994, 5(1), p.52-61, 15 refs.

During the 1991-92 Chinese Antarctic Expedition, full-year glacial investigations of the small dome of Collins Ice Cap were carried out. The data showed that vertical temperature gradients on the dome were about 0.79 C/100 m in the summer and 0.66 C/100 m in the winter. Lower summer temperature in this area is one of the most important conditions for glacial development. 1991-92 was a weak positive balance year, with a mass balance difference of 163 mm, annual ELA of 140 m, mass balance gradient of 8.4 mm/m; mass balance level was 928 mm. Mass balance fluctuations on the small dome for 1971-1992 were calculated by a new method. Results show that the small dome of Collins Ice Cap was relatively stable over 21 years. (Auth. mod.)

F-51731

Xie, Z.C., Wen, J.H., Han, J.K., **Calculation of multi-year mass balance variations on small dome of Collins Ice Cap, King George Island,** *Antarctic research (Chinese edition),* June 1994, 6(2), p.32-39, In Chinese with English summary. 13 refs.

Based on field measured data of mass balance of a small dome of the Collins Ice Cap in 1991-92, meteorological data of summer mean temperatures and annual precipitation, mass balance variations of the small dome from 1971-1992 were calculated. Results show that the contribution of precipitation and temperature to mass balance was 68 and 32%, respectively. From the 70s to the mid 80s, lower annual temperature was beneficial to glacial accumulation; precipitation was less, and its contributions to the mass balance was greater than that of temperature, so a negative mass balance of the small dome occurred. From the mid 80s to the beginning of the 90s, a larger positive mass balance occurred from increased precipitation. The trend of mass balance of the small dome has been close to zero over the last 20 years. (Auth. mod.)

F-51732

Zhu, G.C., et al, **Radar sounding and study of the bedrock topography on Collins Ice Cap,** *Antarctic research (Chinese edition),* June 1994, 6(2), p.40-45, In Chinese with English summary. 2 refs.

Using a high frequency pulse radar at 300 MHz, radar sounding was carried out at 150 points on Collins Ice Cap, and a bedrock echo profile was obtained over 15 km. The maximum ice thickness, 125-131 m, of the Small Dome of the ice cap was located on the summit. The average thickness on the ridge, from the summit of Small Dome to the summit of the Main Dome, was about 109 m. A radar echo was observed at depths of 50-85 m around the summit of the Main Dome, which proved to be a water table by ice coring. The bedrock topography of the Small Dome, in the direction south to north, was similar to that of the northern terrace. (Auth. mod.)

F-51743

Bentley, C.R., et al, **No ice-sheet collapse,** *Nature,* Aug. 26, 1993, 364(6440), p.766, For the article being commented on see 47-1941 or 21F-47715. 7 refs.

In the paper under discussion, the authors, (Blankenship, D.D. *et al, Nature* 361:526-529 (1993)), present evidence for a subglacial volcano which supports the characterization of central West Antarctica as a rift zone. The present author takes issue with such a characterization, believing that a retreat of the grounding line of so great a magnitude as the authors of the cited paper propose would have already produced an instability that renders the proposed collapse mechanism largely irrelevant. The present author also questions the conclusion that "elevated thermal flux provides an important control on the dynamics of the [west antarctic ice sheet]," citing several instances which show that fast moving glaciers are a common occurrence among past ice sheets, very few of which have been associated with volcanoes.

F-51747

Ren, J.W., Qin, D.H., Liu, C., **Crystal fabrics of firn/ice cores from shallow boreholes on Nelson Ice Cap, Antarctica,** *Antarctic research (Chinese edition),* Sep. 1994, 6(3), p.20-24, In Chinese with English summary. 13 refs.

The crystal fabric measurement of three shallow firn/ice cores from Nelson ice cap shows that c-axes orientation is preferred at the surface. Within 20 m depth, a double-fan pattern fabric is dominant. Between 20 and 30 m the fabric pattern has a tendency to change to a single-maximum pattern. These results are very different from those reported from mountain temperate glaciers in lower latitudes. The intense meltwater percolation and refreezing may have an important effect, but the mechanism needs to be studied further in detail. (Auth.)

F-51748

Zhang, W.C., Han, J.K., **Preliminary age determination with numerical modelling for an ice core extracted from Low Dome of Collins Ice Cap, King George Island, Antarctica,** *Antarctic research (Chinese edition),* Sep. 1994, 6(3), p.25-32, In Chinese with English summary. 20 refs.

According to ice flow state, temperature distribution, mass balance and dynamic characteristics of Low Dome on Collins Ice Cap, revealed by observational data collected in situ for more than one year, the Dansgaard-Johnsen model and isothermal ice flow models for n=3 are adopted to calculate the time-scales of an 80.2 m ice core. Calculations show a very approximate time scale of the core; at a depth of 10 m above the bedrock, ages of 1879 y and 1854 y B.P. are obtained by the two models, respectively. The maximum calculation error between the two models is no more than 2%. Comparison with records of volcanic ash layers contained in the middle-upper part of the core suggests an age error of less than 3%. (Auth. mod.)

F-51750

Xie, S.M., Bao, C.L., Hao, C.J., **Study on the oscillation relationship between sea ice of the Arctic and Antarctic,** *Antarctic research (Chinese edition),* Sep. 1994, 6(3), p.38-52, In Chinese with English summary. 16 refs.

In this paper, the antarctic sea ice is divided into 4 regions: SPI1, the eastern antarctic region; SPI2, centered at the Ross Sea; SPI3, centered at the Weddell Sea; and SPI4, the whole antarctic sea region. The arctic sea ice is divided into 3 regions: NPI1 on the Pacific side; NPI2 on the Atlantic side; and NPI3, the whole arctic sea region. Analysis of the SIGRID polar sea ice data provided by WDC-A shows that very complicated interactions exist between the sea ice of the arctic and antarctic regions, with the most outstanding characteristics as follows: the vibration source of interactions between the two poles' sea ice is NPI2. SPI3 is the positive feedback center affecting the antarctic sea ice. SPI2 is the negative feedback center affecting both poles' sea ice. The strongest interactions among NPI2, SPI3 and SPI2 make a quasi-periodic intensity variation between the sea ice of the Antarctic and the Arctic, with a cycle period of 5 to 6 years. This cycle period coincides with the principal period of NPI2 and SPI3 variations. An oscillation between SPI3 and SPI2 is of a zonal nature, while the oscillation between NPI2 and SPI3, or SPI2, is of meridional nature. (Auth. mod.)

F-51761

Lozej, A., Tabacco, I., **Radio echo sounding on Strandline Glacier, Terra Nova Bay (Antarctica),** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.231-244, 20 refs.

This paper is a report of a radio echo sounding (R.E.S.) survey (recently renamed as Ground Penetrating Radar, G.P.R.), carried out on the Strandline Glacier, Terra Nova Bay, during the Italian Antarctic Expedition 1988-89. The Strandline Glacier is a local dry-based glacier of particular interest because its fluctuations can be related to climatic variations. The R.E.S. profile allowed the authors to determine the thickness of the ice cover, the morphology of the bedrock, and to distinguish geometrical trends and discontinuities in the ice cover. R.E.S. profiles will be repeated in future to study variations of ice thickness and to evaluate mass balance. (Auth.)

F-51789

Alley, R.B., MacAyeal, D.R., **West antarctic ice sheet collapse: chimera or clear danger?,** *Antarctic journal of the United States,* 1993, 28(5), p.59-60, 23 refs.

The specter of west antarctic collapse has been with us for a quarter of a century. During that time, opinions on the likelihood of that collapse have varied widely. Recently, certain official assessments (for example, IPCC 1990) concerned primarily with the future response to projected global warming have concluded that Antarctica will not cause much sea-level rise within the planning horizon of a century or so. Nevertheless, the west antarctic stability merits further attention. A west antarctic equivalent of an H-event could raise sea level meters in centuries, with considerable impact on humans. This could occur in response to the warming that ended the last ice age, with no contribution from any future global warming. In colloquial terms, the fuse may have been lit 10,000 years ago for a future ice-sheet H-bomb.

F-51790

Whillans, I.M., **Ice-stream mechanics,** *Antarctic journal of the United States,* 1993, 28(5), p.61-63, 5 refs.

This field program was designed to test some theories for ice-stream mechanics, to describe crevasse opening and the behavior of crevasse bridges, and to study a feature on an interstream ridge that may be a relic from a formerly different ice-stream flow. The method used permitted large strain grids to be surveyed accurately in a short time, horizontal strain rates to be calculated easily in the field, and for the first time, relative vertical velocities to be readily obtained. The acquisition of precise relative vertical velocities over a large area constitutes a new type of measurement that is expected to be useful in testing models for ice flow.

F-51791

Engelhardt, H., Kamb, B., **Vertical temperature profile of ice stream B,** *Antarctic journal of the United States,* 1993, 28(5), p.63-66, 12 refs.

The vertical temperature profile through Ice Stream B has been measured near Upstream B Camp in several hot-water-drilled boreholes, using temperature transducers and thermistors. The ice thicknesses were 1,035 m and 1,057 m in boreholes 500 m apart, transverse to flow of the ice stream. In the first temperature-transducer string, emplaced in 1988-1989, the sensors in the lowest 110 m did not survive the ice pressure. In the 1991-1992 field season, a new thermistor string was emplaced to measure the lowest 167 m in a 1,057 m borehole. In 1992-1993, a thermistor string was placed in the upper 120 m of the ice stream near the 1,057 m borehole. A figure shows all of the equilibrated and extrapolated temperature determinations.

F-51792

Echelmeyer, K.A., Harrison, W.D., **Temperature measurements in the margin of ice stream B, 1992-1993,** *Antarctic journal of the United States,* 1993, 28(5), p.66-67, 3 refs.

The low shear stress at the bottom of Ice Stream B, suggested both by soft subglacier sediment samples and by recent theoretical analyses of transverse profiles of velocity across the ice stream, indicates that the margins of the ice stream probably play a significant role in the dynamics of flow, perhaps exerting more drag on the ice stream than does the bed itself. The most important unknowns are the rate of convergence of ice into the ice stream, the stability of the positions of the margins, and the shear stress itself. The authors examine these unknowns using a program of temperature measurements in the margins and a surveying program to improve knowledge of the rate of convergence of the ice into the ice stream. The work began near Upstream B Camp in the 1992-93 austral summer.

F-51793

Morse, D.L., Waddington, E.D., **Glacier geophysical studies at Taylor Dome: year three,** *Antarctic journal of the United States,* 1993, 28(5), p.67-69, 5 refs.

Taylor Dome is the site of an ongoing ice core/paleoclimate project. The main activities of the 1992-93 season included surveys by ground-based optical methods, surveys using satellite receivers, radio-echo sounding of bedrock topography, and depositional environment characterization.

F-51794

Faure, G., Hagen, E.H., Johnson, K.S., Buchanan, D., **Profile of oxygen isotope compositions of ice in the Lewis Cliff ice tongue, Transantarctic Mountains,** *Antarctic journal of the*

United States, 1993, 28(5), p.69-70, 7 refs.

The isotope compositions of oxygen in ice collected along a line across the northern (lower) part of Lewis Cliff are displayed in a figure. The isotope compositions of oxygen are expressed as the $\delta^{18}O$ parameter relative to standard mean ocean water (abbreviated SMOW). The values of this parameter vary widely from -43.1 to -58.7 per mill and indicate severe depletion of the ice in ^{18}O. The extreme ^{18}O depletion of some of the ice in the Lewis Cliff ice tongue is exceeded only by ice in the core drilled at Vostok Station, where $\delta^{18}O$ values as low as -62 per mill have been reported.. A second interesting feature of the data is the change in the $\delta^{18}O$ parameter from -43.1 per mill at station 500W to -53.1 per mill at station 600W. The decrease of this value by 10 per mill implies a major change in the average annual temperature at the time and place where this ice originally formed.

F-51795

Lal, D., Jull, A.J.T., Donahue, D.J., **Studies of cosmogenic *in situ* produced carbon-14 in polar accumulation and ablation ice,** *Antarctic journal of the United States,* 1993, 28(5), p.70-73, 13 refs.

Pure polar ice contains a suite of extraneous substances that serve as direct and proxy links to the paleoenvironment. These substances—stable and radioactive isotopes, chemical compounds, and particles—are being studied to delineate different aspects of geophysical and environmental changes in the past. A relatively new addition to the useful tracers is the radionuclide ^{14}C, which is directly produced *in situ* in the ice lattice primarily by nuclear interactions of cosmic-ray energetic neutrons with oxygen nuclei. In this article, the authors summarize the highlights of the work done thus far on studies of the *in situ*-produced ^{14}C in accumulation and ablation ice, and indicate the potential of the *in situ* ^{14}C as a tracer for ice dynamics.

F-51799

Ackley, S.F., Gow, A.J., Lytle, V.I., **Salinity variations in Weddell Sea pack ice,** *Antarctic journal of the United States,* 1993, 28(5), p.79-81, 6 refs.

The 5-month lifetime of Ice Station Weddell 1 (ISW-1) enabled revisits to several sites, and studies were made of the evolution of the salinity distribution in the ice cover. Two figures show core profiles taken from a new ice growth area adjacent to the ISW-1 floe. The two cores were taken within 2 m of each other, 30 days apart on Mar. 13 and Apr. 12, 1992. The cores of first-year ice show behavior at variance with arctic ice of similar age, primarily because of their anomalously high near-surface salinities. This results from an initial thick layer of frazil ice and fast freezing of the resulting ice slurry that apparently both contribute to the high surface salinity. For the second-year ice at ISW-1, the mean salinity falls below that of arctic winter ice, reflecting some transformation during the summer warming.

F-51801

Wendler, G., Quakenbush, T., **Ultraviolet radiation and its extinction in antarctic sea ice,** *Antarctic journal of the United States,* 1993, 28(5), p.84-85, 7 refs.

In Dec. 1992, a cruise on the U.S. Coast Guard ice breaker *Polar Star* was made from Hobart, Tasmania, to McMurdo Sound. This report deals with measured attenuation of radiation in sea ice recorded during the cruise, with special attention to ultraviolet (UV) radiation. Only one example of the extinction of radiation in sea ice has been presented. The authors simultaneously measured the sea-ice characteristics (for example, crystal size) and the inclusion of pollutants (algae). More detailed analysis of all the measurements, including modeling results, will be presented later.

F-51806

Domack, E.W., Stein, A.B., **Late Holocene fluctuations in the front of the Muller Ice Shelf, Antarctic Peninsula,** *Antarctic journal of the United States,* 1993, 28(5), p.96-97, 3 refs.

To investigate the fluctuation of the Muller Ice Shelf, the authors collected surface sediment samples, piston cores and kasten cores close to the present calving line. The sand content of surface and downcore samples was most revealing. A modern sand-rich facies is associated with the calving terminus of the Muller Ice Shelf. The sand is being brought into the marine environment by processes acting at the calving terminus of the ice shelf. To determine when the sand was first brought into the system, core sedimentation rates were calculated. Results show that the sand input into Lallemand Fjord began approximately 243 years ago. If sand input is directly related to the ice-front environment of the Muller Ice Shelf, then it can be inferred that this shelf is a relatively recent feature of Lallemand Fjord. If ice shelves accurately reflect the climate of the region, then it must be assumed that there has been a cooling trend over the past 240 years. The most recent historical record, however, shows that the Muller Ice Shelf is disintegrating.

F-51807

Bender, M., et al, **Climate correlations between Greenland and Antarctica during the past 100,000 years,** *Nature,* Dec. 15, 1994, 372(6507), p.663-666, 50 refs.

Ice cores recovered from central Greenland by the GRIP and GISP2 projects have recorded 22 interstadial (warm) events during the part of the last glaciation spanning 20-105 kyr. The ice core from Vostok, East Antarctica records nine interstadials during this period. Explored here are links between Greenland and antarctic climate during the last glaciation, using a high-resolution chronology derived by correlating oxygen isotope data for trapped O_2 in the GISP2 and Vostok cores. This procedure shows that interstadials occurred in East Antarctica whenever those in Greenland lasted longer than 2,000 years. The results suggest that partial deglaciation and changes in ocean circulation are partly responsible for the climate teleconnection between Greenland and Antarctica. Ice older than 115 kyr in the GISP2 core shows rapid variations in the $\delta^{18}O$ of O_2 that have no counterpart in the Vostok record. The age-depth relationship, and thus the climate record, in this part of the GISP2 core appears to be significantly disturbed. (Auth. mod.)

F-51819

Sethmann, R., Burns, B.A., Heygster, G.C., **Spatial resolution improvement of SSM/I data with image restoration techniques,** *IEEE transactions on geoscience and remote sensing,* Nov. 1994, 32(6), p.1144-1151, 12 refs.

A space variant image restoration algorithm has been developed with the aim of improving the spatial resolution of SSM/I (Special Sensor Microwave/Imager) passive microwave imagery. Due to the conical scanning of the instrument the relative geometry of the data samples changes over the scan. This change is accounted for by using a space variant point-spread-function in the restoration algorithm. Application of this algorithm to a scene from the Weddell Sea results in an image with enhanced ice edge and coast definition. As a result, ice concentration estimates near the edge agree more closely with higher resolution (optical) data from AVHRR (Advanced Very High Resolution Radiometer). (Auth. mod.)

F-51820

Jouzel, J., **Ice cores north and south,** *Nature,* Dec. 15, 1994, 372(6507), p.612-613.

The author presents a brief review of recent research on ice cores from Greenland and Antarctica, focusing on the relationship between gases which are trapped in ice sheets and are also present in sea water and the atmosphere. Because of the air bubbles trapped in ice cores, it is now perhaps possible to know more accurately the leads and lags between Northern and Southern Hemisphere climates and more generally between climate forcings over the past 100 kyr. This is important not only for understanding past climate changes but also because this period contains information on climate sensitivity and variability which could be the key to our future climate.

F-51826

Garcia, M.J., **Drift of a giant tabular berg in the antarctic seas,** *World Meteorological Organization. WMO bulletin,* Apr. 1992, 41(2), p.181-183, 7 refs.

On Aug. 28, 1991, weather analysts at the Satellite Center of the National Meteorological Service (NMS) of Argentina detected a large block of ice in the vicinity of the South Shetland Is. From then on, the displacement of the giant tabular berg has been monitored using pictures from the HRPT (high-resolution picture transmission) receiving station in Villa Ortúzar, Buenos Aires, while studies are being made of its origin. Background data, and analysis of the satellite images shown, are given.

F-51834

Rosman, K.J.R., Chisholm, W., Boutron, C.F., Candelone, J.P., Patterson, C.C., **Anthropogenic lead isotopes in Antarctica,** *Geophysical research letters,* Dec. 1, 1994, 21(24), p.2669-2672, 18 refs.

This paper reports the first measurements of Pb isotopes in antarctic snow, which show that even recent snow containing 2.3 pg/g is highly polluted with anthropogenic Pb. This follows from a comparison of isotope abundances of Pb in surface snow and terrestrial dust extracted from ancient antarctic ice (Dome C, depth 308 m, approximate age 7,500 a BP), the latter being distinctly more radiogenic. This result is independent of geochemical arguments based on measurements of Al, Na and SO_4. South America is suggested as a likely source of this anthropogenic Pb. The presence of significantly less radiogenic Pb in the snow adjacent to two antarctic base stations indicates that there is contamination from station emissions, although emission from Australia is an alternative explanation for a site 33 km from Dumont d'Urville. (Auth. mod.)

F-51840

Comiso, J.C., Ackley, S.F., **Antarctic sea ice passive microwave signatures during summer and autumn,** International Geoscience and Remote Sensing Symposium, Pasadena, CA, Aug. 8-12, 1994. Proceedings, Vol.1, Piscataway, NJ, Institute of Electrical and Electronics Engineers, Inc., 1994, p.143-146, 10 refs.

The microwave signatures of antarctic sea ice during the summer and autumn of 1992 are examined using SSM/I data in conjunction with ERS-1 SAR data and observations from an ice station in the western Weddell Sea region. The period from Feb. through Apr. is observed to be critical in terms of monitoring sea ice cover with passive microwave sensors because of surface effects (e.g. melt, slush and flooding) that may cause large fluctuations in the signature of sea ice during the period. Ice concentrations calculated using reference brightness temperatures normally used for winter data are considerably lower than those observed in the field and those derived from SAR data. Reference temperatures more appropriate for the summer ice data were inferred and provided more compatible ice concentrations. In late summer and autumn, freezing conditions begin to dominate and the brightness temperatures of sea ice, still different from those of winter, reflect those primarily of refrozen slush over thick ice, young ice, and new ice.

F-51841

Markus, T., Fischer, H., Burns, B.A., **Contribution of antarctic coastal polynyi to total ice production: comparison of satellite- and model-derived estimates,** International Geoscience and Remote Sensing Symposium, Pasadena, CA, Aug. 8-12, 1994. Proceedings, Vol.1, Piscataway, NJ, Institute of Electrical and Electronics Engineers, Inc., 1994, p.147-149, 15 refs.

Daily measurements of coastal polynyas in the Weddell Sea were carried out from July through Nov. 1987 with a special method applied to passive microwave data of the SSM/I. Using the derived areas along with surface air temperature and wind field data, freezing rates and the amount of ice produced in the polynyas have been estimated. The results are compared with ice concentration analyses and a large-scale dynamic-thermodynamic sea ice model. The comparison shows that daily changes in near-coast freezing rates, predominantly caused by changes in polynya area, are reflected in changes in the freezing rate for the entire Weddell Sea. Additionally, a polynya area of only 0.3% of the Weddell Sea ice extent can be responsible for a change in ice extent of 5.5%. Although in general the model results for areas adjacent to the coast agree with the passive microwave results, some areas show significant differences in freezing rates.

F-51842

Viehoff, T., Li, A., Oelke, C., Rebhan, H., **Characteristics of winter sea ice conditions in the southwestern Weddell Sea in 1992 as derived from multi-sensor observations,** International Geoscience and Remote Sensing Symposium, Pasadena, CA, Aug. 8-12, 1994. Proceedings, Vol.1, Piscataway, NJ, Institute of Electrical and Electronics Engineers, Inc., 1994, p.150-152, 9 refs.

Sea ice conditions in the southwestern Weddell Sea during austral summer 1992 were analyzed using different remote sensing techniques as well as satellite-tracked buoy data. The temporal and spatial variability of the large scale ice concentration of first-year and multi-year ice fraction were extracted from SSM/I passive microwave data for the period 1987-1992. The results were compared with backscatter signatures from the ERS-1 SAR as well as with ice motion data from the AVHRR and from buoys. The combination of these data indicates that in the southwestern Weddell Sea a sea ice regime of mostly first-year ice exists which is different from the basinwide ice conditions. The spatial separation of both regimes is correlated with the continental slope, indicating that the barotropic part of the ocean circulation is a dominant factor for the forcing of the ice cover.

F-51843

Drinkwater, M.R., Kottmeier, C., **Satellite microwave radar- and buoy-tracked ice motion in the Weddell Sea during WWGS '92,** International Geoscience and Remote Sensing Symposium, Pasadena, CA, Aug. 8-12, 1994. Proceedings, Vol.1, Piscataway, NJ, Institute of Electrical and Electronics Engineers, Inc., 1994, p.153-155, 3 refs.

The first results of ERS-1 SAR sea-ice drift tracking are presented for Antarctica. Summer and winter examples illustrate temporal variations in ice drift in the western and eastern Weddell Sea during two field experiments. Time-series of mean drift velocity, divergence and rotation are compared with meteorological data from an ice camp and by instrumented buoys. Results indicate that SAR successfully characterizes the 'spatially mesoscale' kinematics of Weddell Sea ice during summer and winter, if the coverage as well as temporal and spatial sampling are judiciously planned. Measurements show that winter ice production mostly occurs during synoptic events where pulses of wind force ice divergence, lead formation and ice growth.

F-51844

Long, D.G., Early, D.S., Drinkwater, M.R., **Enhanced resolution ERS-1 scatterometer imaging of southern hemisphere polar ice,** International Geoscience and Remote Sensing Symposium, Pasadena, CA, Aug. 8-12, 1994. Proceedings, Vol.1, Piscataway, NJ, Institute of Electrical and Electronics Engineers, Inc., 1994, p.156-158, 5 refs. For another version, see 49-1187 or 22F-51496.

The ERS-1 mission has generated a wealth of radar data over the Southern Hemisphere polar region. While the SAR mode of the ERS-1 Active Microwave Instrument can provide only limited temporal and spatial coverage, the scatterometer mode provides frequent global coverage, albeit at a much lower (50 km) resolution. By applying a recently developed algorithm for generating enhanced resolution scatterometer images, the ERS-1 scatterometer data can be used to study both sea ice and glacial ice to support SAR-based studies. This paper describes the algorithm and its application to ERS-1 scatterometer data with particular emphasis on sea ice. Selected images from a time series covering a complete annual cycle are presented.

F-51845

Drinkwater, M.R., Early, D.S., Long, D.G., **ERS-1 investigations of southern ocean sea ice geophysics using combined scatterometer and SAR images,** International Geoscience and Remote Sensing Symposium, Pasadena, CA, Aug. 8-12, 1994. Proceedings, Vol.1, Piscataway, NJ, Institute of Electrical and Electronics Engineers, Inc., 1994, p.165-167, 3 refs.

Coregistered ERS-1 SAR and scatterometer data are presented for the Weddell Sea. Calibrated image backscatter statistics are extracted from data acquired in regions where surface measurements were made during two extensive international Weddell Sea experiments in 1992. Changes in summer ice-surface conditions due to temperature and wind are shown to have a large impact on observed microwave backscatter values. Winter calibrated backscatter distributions are also investigated as a way of describing ice thickness conditions in different locations during winter. Coregistered SAR and EScat data over a manned drifting ice station are used to illustrate the seasonal signature changes occurring during the fall freeze-up transition. Combinations of Weddell Sea SAR and scatterometer data are shown to be extremely powerful tools for monitoring both sea-ice dynamics and the thermodynamic changes which accompany seasonal transitions in the southern ocean. (Auth.)

F-51847

Moctezuma Flores, M., Maitre, H., Parmiggiani, F., **Sea-ice velocity fields estimation on Ross Sea AVHRR images,** International Geoscience and Remote Sensing Symposium, Pasadena, CA, Aug. 8-12, 1994. Proceedings, Vol.3, Piscataway, NJ, Institute of Electrical and Electronics Engineers, Inc., 1994, p.1300-1302, 12 refs.

AVHRR (Advanced Very High Resolution Radiometry) imagery of the Ross Sea in Dec. 1990 has been analyzed to obtain information about the geophysical processes acting during the melting season. A complete methodology is proposed for automatic tracking of sea-ice in daylight AVHRR data. Previous tracking algorithms have been able to retrieve sea-ice motion under limited atmospheric conditions; cloud-free data are normally required. In this study weaker hypotheses are introduced in order to remain under normal circumstances. Two aspects are outlined: the use of partially cloudy monocular images and the estimation of ice pack trajectories along an image sequence. First, a classification technique is applied for the discrimination of clouds over the sea and for the detection of snow-ice regions. Then an optimal matching filter is used for the sea-ice motion estimation. The final derived vector field is homogeneous and shows the ice pack motion over three days of image data. (Auth. mod.)

F-51851

Takahashi, A., et al, **Study on glacier movement using satellite SAR and visible/near-IR imagery,** International Geoscience and Remote Sensing Symposium, Pasadena, CA, Aug. 8-12, 1994. Proceedings, Vol.4, Piscataway, NJ, Institute of Electrical and Electronics Engineers, Inc., 1994, p.2391-2393, 5 refs.

The movement of Shirase glacier and Kaya glacier in Lützow-Holm Bay was analyzed using LANDSAT/TM, MSS, MOS-1/MESSR and ERS-1/SAR data. Through multi-temporal analysis, velocity of the Shirase glacier floating ice tongue is estimated to be 2.9 km/year for 1988-1989 and 2.6 km/year for 1989-1991. The ERS-1/SAR image was compared with MOS-1/MESSR near-IR images for Kaya glacier and sea ice. Floating ice tongue edges and fast ice in both images show clear differences, which suggests the importance of multi-sensor analysis for glacier study. (Auth. mod.)

F-51857

Clark, P.U., **Fast glacier flow over soft beds,** *Science,* Jan. 6, 1995, 267(5194), p.43-44, 15 refs.

The author provides a brief synthesis of recent and current research into the mechanisms which determine the flow characteristics of glaciers. The case for bed sediment deformation is considered, as is that of no sediment action but instead an increase in subglacial water pressure causing the glacier to rise above the bed. A third possibility for controlling flow mechanisms lies in localized bedrock knobs, "sticky spots" that support high basal shear stress. Modelling a mixed bed of sticky spots, subglacial water pressure, and deforming sediments remains a problem.

F-51864

Colhoun, E.A., **Studies of Cainozoic environmental change in Tasmania and coastal Antarctica: a review,** *Australian geographer,* May 1993, 24(1), p.3-11, 51 refs.

Observational studies on Cainozoic environmental changes in both Tasmania and East Antarctica have led to important modifications in the accepted interpretation of the history of glaciation for each area. Many contributors have played an important role in the processes of investigation leading to the present state of knowledge. A crucial role has been played by the integration of the methods of glacial geomorphology, stratigraphy, sedimentology and dating methods. From studies based on combinations of these approaches, a model of multiple glaciations has been developed to explain observed features in Tasmania. This model is complemented by studies of vegetation history, largely through pollen analysis. A fuller history of ice-sheet fluctuations in East Antarctica is beginning to emerge from similar applications of cross-disciplinary studies. (Auth.)

F-51866

Kamb, B., **Rheological nonlinearity and flow instability in the deforming bed mechanism of ice stream motion,** *Journal of geophysical research,* Sep. 10, 1991, 96(B10), p.16,585-16,595, 63 refs.

Contrary to what has recently been assumed in modeling the proposed deforming bed mechanism for the rapid motion of antarctic ice streams, the rheology of water-saturated till is probably highly nonlinear, according to information from soil mechanics and preliminary experiments on till from the base of Ice Stream B. The equivalent flow law exponent n is probably as high as 100, and the nonlinearities of the shear stress and effective pressure dependences are closely linked. The high nonlinearity has important consequences for the deforming bed mechanism. A flow system operating by this mechanism can be unstable as a result of feedback from the generation of basal water by shear heating of basal till. The short-term feedback effect is analyzed for a perturbation in a model ice stream in which the basal meltwater is transported through a distributed system of narrow-gap conduits at the ice-till interface. Although the analysis is approximate and some of the system parameters are poorly known, the results suggest that the deforming bed mechanism is unstable for $n>20$. The apparent absence of such instability in currently active ice streams implies that their motion is controlled not by the deforming bed but by some other as yet unidentified mechanism. (Auth.)

F-51867

Ledley, T.S., **Snow on sea ice: competing effects in shaping climate,** *Journal of geophysical research,* Sep. 20, 1991, 96(D9), p.17,195-17,208, 26 refs.

The impact of the addition of snow and its thermal properties on sea ice and leads and the subsequent effect on climate are examined in this study. The results show that the thermal properties of snow introduce competing effects on climate. The first effect is that the snow acts as an insulator, keeping the ice warm and thus thin. The second effect is that snow has a lower volumetric specific heat and volumetric heat of fusion than ice, causing it to cool, warm, and melt more easily than ice. This produces longer periods of ice-free conditions during the summer and thus a warmer climate. The third effect is that snow has a higher albedo than ice. This causes a reduction in the absorbed solar energy by the entire Earth-atmosphere system and results in a cooling of the climate. The results described here indicate that the albedo effect is dominant, so that the addition of snow cools the climate. These results show that snow on sea ice is a very important factor in shaping polar climate and that significant changes in the thickness and/or extent of the snow cover could have important implications for understanding changes in our climate. (Auth.)

F-51868

Dai, J.C., Mosley-Thompson, E., Thompson, L.G., **Ice core evidence for an explosive tropical volcanic eruption 6 years preceding Tambora,** *Journal of geophysical research,* Sep. 30, 1991, 96(D9), p.17,361-17,366, 34 refs.

High-resolution analyses of ice cores from Antarctica and Greenland reveal an explosive volcanic eruption in the tropics in 1809 which is not reflected in the historical record. A comparison in the same ice cores of the sulfate flux from the 1809 eruption to that from the Tambora eruption (1815) indicates a near-equatorial location and a magnitude roughly half that of Tambora. Thus this event should be considered comparable to other eruptions producing large volumes of sulfur-rich gases such as Coseguina, Krakatau, Agung, and El Chichón. The increase in the atmospheric concentration of sulfuric acid may have contributed to the Northern Hemisphere cooling observed in the early 19th century and may account partially for the decline in surface temperatures which preceded the eruption of Tambora in 1815. (Auth. mod.)

F-51877

Harder, M., Lemke, P., **Modelling the extent of sea ice ridging in the Weddell Sea,** *American Geophysical Union. Geophysical monograph series,* 1994, No.85, Polar oceans and their role in shaping the global environment. Edited by O.M. Johannessen, R.D. Muench, and J.E. Overland, p.187-197, 14 refs.

A dynamic-thermodynamic sea ice model is modified to distinguish level and ridged ice and is applied to the Weddell Sea. The model explicitly states different prognostic thicknesses for ridged and unridged ice, using four extended continuity equations which include terms to transform level ice into ridged ice due to deformation. Significantly different temporal evolution and spatial distribution for the two ice classes are predicted.

Another important extension of the sea ice model, the age of both level and ridged ice, is introduced additionally through two prognostically determined variables, described by two extended continuity equations.

F-51879

Wadhams, P., **Sea ice thickness changes and their relation to climate,** *American Geophysical Union. Geophysical monograph series,* 1994, No.85, Polar oceans and their role in shaping the global environment. Edited by O.M. Johannessen, R.D. Muench, and J.E. Overland, p.337-361, Refs. p.358-361.

The current state of knowledge of sea ice thickness variability in the Arctic and Antarctic is reviewed and evidence for the impact of climate change is provided. The statistical properties of the ice thickness distribution and the mechanisms underlying its development are examined and the shape of the distribution and the statistics of pressure ridge keel depths, slopes, widths and spacings are discussed. In the Antarctic useful results to date on ice thickness distribution have come mainly from drilling, which greatly limits the generality of the conclusions that can be drawn. Data are far too sparse to provide evidence for climate-related changes. Some interesting aspects of antarctic sea ice are the fact that first-year ice is very thin (about 60 cm); that the deep snow cover causes a significant fraction of the ice to undergo flooding leading to snow-ice formation; and that pressure ridges tend to be shallow with drafts of less than 6 m. (Auth. mod.)

F-51880

Fischer, H., Lemke, P., **On the required accuracy of atmospheric forcing fields for driving dynamic-thermodynamic sea ice models,** *American Geophysical Union. Geophysical monograph series,* 1994, No.85, Polar oceans and their role in shaping the global environment. Edited by O.M. Johannessen, R.D. Muench, and J.E. Overland, p.373-381, 27 refs.

Presently several improved sea ice-ocean models are being developed in order to investigate the role of sea ice in determining the boundary conditions at the sea surface and to assess its influence on the global ocean circulation. For driving sea ice-ocean models atmospheric data sets are being compiled using analyses of numerical weather prediction models, *in situ* observations and remote sensing products. Since these forcing data (wind, temperature, humidity, precipitation and cloud cover) originate from a variety of sources with different accuracy, the question arises how accurate the atmospheric data have to be in order to be useful for a realistic simulation of sea ice variability on a seasonal and interannual time scale. This paper presents an error analysis on the basis of numerical experiments with a dynamic-thermodynamic sea ice-mixed layer model for the Weddell Sea. (Auth. mod.)

F-51888

Bentley, C.R., **Sedimentation by the antarctic ice sheet from a glaciological perspective,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.249-250, 15 refs.

The author addresses the questions of what the glaciological evidence and expectations are for changes in the dimensions of the ice sheet and how the sedimentation process is tied to those changes. He suggests that the discharge of till beneath the ice shelf at the grounding line will facilitate grounding-line advance in times of falling sea level. The till delta will be changed from a zone of progressive decoupling between the ice and its bed into a zone of active erosion. Re-activated till will be deposited at the grounding line, thus helping it to advance. This process may have made it possible for the grounding line in the Ross Embayment to advance well out into the Ross Sea during the last glacial maximum.

F-51964

Bromwich, D.H., **Ice sheets and sea level,** *Nature,* Jan. 5, 1995, 373(6509), p.18-19, 11 refs.

An appraisal is made assessing the influence of changes in atmospheric temperatures and storm tracks in both hemispheres on global warming and sea level. The evidence seems to point to storm tracks as the dominant mechanism.

F-51966

Stiévenard, M., Delmotte, M., Jouzel, J., Fléhoc, C., **Mass spectrometry analysis of water stable isotopes: reconstruction of past climates from polar ice cores,** *Analusis,* Sep. 1994, 22(7), p.M21-M24, 3 refs.

The determination of D/H and $^{18}O/^{16}O$ isotopic ratios in ice accumulated in polar regions allows one to reconstruct past temperature changes over glacial-interglacial cycles. They are also used to estimate past accumulation changes and thus the age of the ice with respect to depth. In addition, they can give additional information about the origin of polar precipitations. Data on the Vostok core are included.

F-51967

Chappellaz, J., **Polar ice bubbles as recorders of past greenhouse gas concentrations,** *Analusis,* Sep. 1994, 22(7), p.M25-M28, 19 refs.

Polar ice bubbles are unique tools for the reconstruction of the composition of the Earth's atmosphere in the past. Their analysis is a difficult task, which has been achieved by few laboratories in the world. These small bubbles have already highlighted the unprecedented impact of anthropogenic activity on this life-sustaining envelope, and demonstrated how well greenhouse gases parallel past climate changes. Data on Vostok and GRIP ice cores are included.

F-51968

Pourchet, M., Pinglot, J.F., **Radioactivity of arctic and antarctic snow,** *Analusis,* Sep. 1994, 22(7), p.M29-M30, 3 refs.

In glaciology, the amounts of natural and artificial radionuclides in snow are used for the studies of glaciers or atmospheric transport processes. Fallout in antarctic snow from nuclear tests in the 1950-1980 period, from the disintegration of the Cosmos 1402 satellite in Feb. 1983, and from the Chernobyl accident in Apr. 1986, is summarized. (Auth. mod.)

F-51969

Wolff, E.W., Peel, D.A., **Assessing global and local pollution for heavy metals in Antarctica,** *Analusis,* Sep. 1994, 22(7), p.M41-M43, 10 refs.

The antarctic continent is often considered to be the last pristine environment on Earth. However, by analyzing the layers of snow that have accumulated there, it is possible to trace recent increases in concentrations of some heavy metals. Most of this material originates outside Antarctica. (Auth.)

F-51970

Bol'shov, M.A., Boutron, C.F., **Determination of heavy metals in polar snow and ice by laser-excited atomic fluorescence spectrometry,** *Analusis,* Sep. 1994, 22(7), p.M44-M46, 11 refs.

The new laser-excited atomic fluorescence spectrometry technique offers unrivalled sensitivity for the determination of trace metals in a wide variety of samples. This has allowed the direct determination of Pb, Cd and Bi in antarctic and Greenland snow and ice down to the sub pg/g level. (Auth.)

F-51971

Scarponi, G., Barbante, C., Cescon, P., **Differential pulse anodic stripping voltammetry for ultratrace determination of cadmium and lead in antarctic snow,** *Analusis,* Sep. 1994, 22(7), p.M47-M50, 16 refs.

Differential pulse anodic stripping voltammetry has sufficient sensitivity to be used for direct determination of heavy metals in antarctic snow, thus avoiding long and contamination-prone enrichment procedures. A result of particular concern to global change studies can be drawn from these preliminary data: lead concentration in antarctic snow decreased rapidly during the 1980s from about 10-15 pg/g to 2-4 pg/g in 1991. (Auth.)

F-51972

Rosman, K.J.R., Chisholm, W., **Determination of lead isotopes in arctic and antarctic snow and ice,** *Analusis,* Sep. 1994, 22(7), p.M51-M53, 11 refs.

The development of high sensitivity mass spectrometry to measure Pb isotopes in arctic and antarctic snow and ice has provided a powerful tool for identifying sources of global Pb pollution. The combination of isotope abundance information with concentration measurements adds another dimension to analytical chemistry. (Auth.)

F-52038

Uratsuka, S., Okamoto, K., Mineno, H., Nishio, F., Mae, S., **Step frequency radar experiments on the antarctic sea ice,** *Journal of the Communications Research Laboratory,* Nov. 1988, 35(146), p.251-258, 11 refs.

UHF step frequency radar experiments have been carried out on sea ice near Showa Station as part of the 27th JARE to develop an airborne sensor for measuring vertical sea ice structures. The radar transmits 32 different frequencies in a stepwise fashion between 300 and 796 MHz and measures the amplitude and phase of reflected waves at each frequency. The discrete Fourier transform of the 32 complex values of signals indicates the distance of vertical sea ice structures. The range resolution is about 15 cm in sea ice. The experiments are the first application of this radar for measuring sea ice thickness. The experiments showed that the radar system could successfully measure vertical sea ice structures. The distance between the surface and the snow/ice interface or between the surface and the sea ice bottom deduced by this method coincided with practical measurements of sample holes. Snow depth was detected very clearly by the radar system. (Auth.)

F-52048

Kivimaa, S., Kosloff, P., **Compressive strength and structure of sea ice in the Weddell Sea, Antarctica,** Marine, offshore and ice technology. Edited by T.K.S. Murthy, P.A. Wilson and P. Wadhams and Ice Technology Conference, 4th, Southampton, UK, Sep. 15-16, 1994, Southampton, UK, Computational Mechanics Publications, 1994, p.331-342, 11 refs.

Field experiments on antarctic sea ice physical properties were performed in the Weddell Sea during the Finnish Antarctic Expedition in 1989-90. The examined ice included shorefast ice and pack ice floes. Altogether 61 ice cores were drilled from 12 test sites. The temperature, salinity and density distributions in the ice cores were measured. Ice thin sections were prepared and photographed through crossed polaroids to study ice structural characteristics. The unconfined uniaxial compressive strength of ice was tested with 165 samples within the ambient temperatures of the ice floes. The tests were made in the brittle range with high strain rate both *in-situ* and in the cold laboratory container on board R/V *Aranda.* The sampling techniques and testing procedures are described. Typical profiles of ice salinity, density, temperature and uniaxial compressive strength in the ice floes are presented. The results of genetic and textural classification of ice samples are given. Ice unconfined uniaxial compressive strength versus ice total porosity is illustrated. (Auth. mod.)

F-52049

Wadhams, P., **Remote sensing of snow and ice and its relevance to climate change processes,** NATO Advanced Study Institute on Remote Sensing and Global Climate Change, Dundee, Scotland, July 19-Aug. 8, 1992. Proceedings. Edited by R.A. Vaughan et al and NATO Advanced Science Institutes, Series I. Global Environmental Change, Vol.24, Berlin, Springer-Verlag, 1994, p.303-339, 40 refs.

This paper reviews those physical processes in snow and ice which are important to climate change, and will describe how remote sensing techniques are used to map the cryosphere and hence to allow the magnitude and direction of climatic change in the polar regions to be estimated. The review includes an overview of the structure and morphology of ice and snow and the geophysical processes in which ice and snow are involved and the physics of interaction between electromagnetic waves and a snow or ice surface and the remote sensing techniques commonly used to study ice and snow (including acoustic as well as electromagnetic methods). The greenhouse effect is described with reference to the cryospheric processes which cause the rate of warming to be enhanced in north polar regions. The importance of ice and snow processes in amplifying the rate of ground level warming is delineated. Also analyzed in detail is the use of remote sensing techniques to monitor four key parameters. These are (1) the contribution of melting glaciers and ice sheets to the rate of global sea level rise; (2) the evidence for a retreat of sea ice in the polar regions; (3) the problem of the synoptic mapping of sea ice thickness, and the evidence for thinning of sea ice; and (4) the evidence for a retreat of seasonal snowpack in the Northern Hemisphere. (Auth. mod.)

F-52050

Mantripp, D.R., **Study of Antarctica using the ERS-1 radar altimeter,** NATO Advanced Study Institute on Remote Sensing and Global Climate Change, Dundee, Scotland, July 19-Aug. 8, 1992. Proceedings. Edited by R.A. Vaughan et al and NATO Advanced Science Institutes, Series I. Global Environmental Change, Vol.24, Berlin, Springer-Verlag, 1994, p.341-354, 31 refs.

The ERS-1 Radar Altimeter is proving to be the best instrument to date for mapping the antarctic topography from space and promises to become a major contributor to glaciology. The provision of the ice mode allows areas hitherto inaccessible to radar altimetry to be mapped and the near-polar orbit allows a far greater proportion of Antarctica to be covered than has previously been possible. ERS-1 provides coverage of Antarctica to 82°S, allowing full coverage of the Filchner-Ronne Ice Shelf, most of the Ross Ice Shelf and also vast areas of the Antarctic Plateau which to date have been mapped only by sparse ground and airborne surveys. However, an unsurveyed hole remains, a circular area of 2.5 million km^2, including some of the most important parts of the Ross and Filchner-Ronne drainage basins. Filling this last gap can only begin with missions planned by ESA and NASA for the end of the century and beyond. (Auth. mod.)

F-52051

Bol'shov, M.A., Koloshnikov, V.G., Rudnev, S.N., Boutron, C.F., **Toxic trace metal detection in samples of polar ice and snow using laser atomic fluorescence spectroscopy,** *Optics & spectroscopy,* Feb. 1994, 76(2), p.212-216, Translated from Optika i spektroskopiia. 21 refs.

An ultrasensitive method of atomic fluorescence spectroscopy was used for direct determination of Pb, Cd, and Bi content in samples of depth ice layers from Antarctica. The experimental results are compared with the data of other methods. Contributions from various natural sources of metals in the atmosphere are discussed. (Auth.)

F-52128

Minale, M., Astarita, G., **On mass diffusion effects in a Stefan-like problem arising in the melting of antarctic ice shelves,** *Chemical engineering science,* Oct. 1994, 49(19), p.3205-3215, 16 refs.

This paper analyzes the effect of mass diffusion in a Stefan-like problem, referring to the interaction between ice shelves and seawater in Antarctica. It is concluded that, in this example, the results obtained with a model which takes into account mass diffusion are almost indistinguishable from those obtained from the mass diffusion-free model, and that therefore possible inversion layers are to be attributed to effects other than mass transfer of salt. (Auth. mod.)

F-52150

Glazovskiĭ, A.F., **Ice sheet-bed rock interaction on the continental margins** [Vzaimodeĭstvie lednikovykh pokrovov s lozhem v predelakh materikovykh okrain], Moscow, Mezhduvedomstvennyĭ geofizicheskiĭ komitet AN SSSR, 1989, 121p., In Russian with English summary and table of contents. Refs. p.110-121.

This book summarizes materials relating to the dynamics of marginal areas in present-day and older glaciations, especially in Antarctica, Greenland, and North America. The activities of ice sheets resulting in the morphology of continental margins are investigated. Glacier drainage patterns, their distribution, and special features in the structure of fjords and bottom troughs are examined. Current concepts are analyzed as to the mechanisms of glacial erosion and processes occurring on the bed within continental margins that are or have been occupied by glaciers. Examples of rates of glacial erosion beneath outlet glaciers are given. The total rate of transformation of continental margins by glaciers is estimated. (Auth. mod.)

F-52168

Raynaud, D., **Ice core records as a key to understanding the history of atmospheric trace gases,** International Symposium on Environmental Biogeochemistry, 10th, San Francisco, CA, Aug. 19-24, 1991. Selected papers. Biogeochemistry of global change—radiatively active trace gases. Edited by R.S. Oremland, London, Chapman & Hall, 1993, p.29-45, 40 refs.

Analysis of gases trapped in ice now allows the possibility to document widely the anthropogenic influence back in time and to extend the trace gas (TG) record over time periods (Little Ice Age, glacial-interglacial cycle) encompassing climatic change with little or no human disturbance. This paper examines the mechanism through which ice traps air and which parameters could affect the atmospheric TG record frozen in the ice; reviews the existing ice records from CO_2, CH_4, and N_2O and their implications for environmental biogeochemistry and climatic impact from these records; and stresses the potential for other measurements to be performed on trace gases extracted from ice cores. (Auth. mod.)

F-52169

Semiletov, I.P., **Ancient ice air content of the Vostok ice core,** International Symposium on Environmental Biogeochemistry, 10th, San Francisco, CA, Aug. 19-24, 1991. Selected papers. Biogeochemistry of global change—radiatively active trace gases. Edited by R.S. Oremland, London, Chapman & Hall, 1993, p.46-60, 39 refs.

A deep ice core drilled at Vostok Station provides a record of atmospheric climate and CO_2 that is representative of global changes over the last glacial-interglacial-penultimate glacial cycle (about 200 kyr). The final Vostok core in 1989 approached 2540 m. This paper discusses the initial CO_2 record obtained to 2340 m. A combination of static head-space extraction and stripping the remaining dissolved gas was followed by gas-chromatographic analysis. The obtained data show the "warm" maxima indicated by CO_2 ice core content at 2280 m. The link between the process of air capture and release during the snowflake formation, snow accumulation, metamorphism, and sintering was considered. It was shown that the carbon ionic species, which were trapped during snowflake formation, might be the cause for the discrepancy between the CO_2 measurements "wet" and "dry" techniques. The possible mechanism at the Younger Dryas signal is also considered. (Auth. mod.)

F-52178

Gloersen, P., **Modulation of hemispheric sea-ice cover by ENSO events,** *Nature,* Feb. 9, 1995, 373(6514), p.503-506, 16 refs.

The El Niño/Southern Oscillation (ENSO) is a quasiperiodic variation in climate which arises from a complex interaction between the tropical Pacific Ocean and the atmosphere. ENSO events, which occur every two to seven years, are the largest source of interannual variability of temperature and precipitation on a global scale, although their effects are most profound in the tropics. Observations of sea-ice margins have been used to monitor global climate changes on time scales of greater than a decade, and there is some evidence for interannual variations in records of sea-ice cover. But short-term changes in sea-ice cover are masked by pronounced seasonal variations, making it difficult to correlate them with specific climate phenomena. Using a multiple-window harmonic analysis technique, it is shown here that time series of sea-ice cover from the Arctic and Antarctic contain statistically significant quasi-biennial and quasi-quadrennial periodicities that agree well with variations in the ENSO index. (Auth.)

F-52182

Candelone, J.P., Hong, S.M., Boutron, C.F., **Improved method for decontaminating polar snow or ice cores for heavy metal analysis,** *Analytica chimica acta,* Dec. 20, 1994, 299(1), p.9-16, 30 refs.

An improved method has been developed for the decontamination of Greenland and antarctic snow or ice cores for heavy metal analysis. The investigated core sections are chiselled while being held horizontal in a polyethylene lathe inside a laminar flow clean bench in a cold room. Each veneer layer and the final inner core are then analyzed for Pb, Cd, Zn and Cu by graphite furnace atomic absorption spectrometry in clean room conditions. The procedural blank was found to range from 0.015 pg/g for Cd up to 0.25 pg/g for Cu. The quality of the decontamination was checked by studying changes in heavy metal concentrations from the outside to the center of each core section. In most cases, good plateaus of concentrations were observed in the central parts, indicating that contamination present on the outside of the cores was not transferred to these central parts. Various Greenland and antarctic cores were decontaminated, giving new insights into the past and recent occurrence of heavy metals in the atmosphere of both hemispheres. (Auth. mod.)

F-52189

Morris, E.M., Anderson, P.S., Bader, H.P., Weilenmann, P., Blight, C., **Modelling mass and energy exchange over polar snow using the DAISY model,** *International Association of Hydrological Sciences. IAHS publication,* 1994, No.223, Snow and ice covers: interactions with the atmosphere and ecosystems. Edited by H.G. Jones, T.D. Davies, A. Ohmura, and E.M. Morris, p.53-60, 9 refs. Presented at a joint IAMAP/IAHS symposium in Yokohama, Japan, July 1993.

In the antarctic winter of 1991 an extensive series of micrometeorological and snow cover measurements were made as part of the second Stable Boundary Layer Experiment (STABLE II) at Halley Station. These data have been used to validate the DAISY distributed snow model using parameter values determined by calibration with independent data collected at Halley during the International Geophysical Year 1957-1958. These "effective" parameter values are consistent with values determined by other independent experiments on polar snow. Simulation of the STABLE data is successful except during periods of very high stability in the boundary layer. A better simulation of the snow surface temperature is obtained by using a roughness length of 5 cm for heat and water vapor transport rather than the value of 0.01 cm used for the aerodynamic roughness length. This suggests that the magnitude of turbulent heat and mass transfer may be larger than hitherto assumed in modelling the response of polar snow to climate change. (Auth.)

F-52236

Li, P.J., **Response of cryosphere to global warming and reduced rise in sea level,** *Journal of glaciology and geocryology,* Sep. 1994, 16(3), p.274-282, In Chinese with English summary. 27 refs.

Several recent reports of polar ice-sheet growth concluded that accumulation rates in Antarctica vary in proportion to mean annual air temperature; recent accumulation rates (1975-1985) are 20% above the long-term mean (1930-1985). This increase in accumulation rate should contribute to a lowering of sea level of 0.1-1.2 mm/a. Measurement of Greenland surface elevation by satellite altimetry suggests that the ice-sheet elevation is increasing. The spatially averaged elevation change is 0.23 m/a thickening. The implied global sea level depletion is 0.2 to 0.4 mm/a. It does appear that growth in ice sheets will damp future sea level rise and a reduced threat of sea level rise is likely. On the other hand, present studies supporting recent ice sheet growth depend on limited measurements, and are challenged by a simple model interpretation. (Auth. mod.)

F-52281

Wang, D.D., Dai, C.D., **Study on cosmic dust particles in the antarctic ice, snow and non-antarctic region and their origin,** *Antarctic research (Chinese edition),* Dec. 1994, 6(4), p.1-13, In Chinese with English summary. Refs. p.12-13.

A large number of cosmic dust particles, micrometeorites and volcanic dust bands have been found and collected in antarctic ice, snow and glacial sediments, especially in meteorite-concentrated regions. Extraterrestrial spherules also have been discovered from the stratosphere and deep-sea sediments. On the basis of distributive characteristics, cosmic dust particles are classified into interplanetary dust particles and interstellar dust particles. According to their origin, cosmic dust particles can be divided into cometary origin, asteroidal origin, ablation from meteorites and interstellar origin. The criteria for identifying cosmic dust particles have been established, and the origin of cosmic dust particles is discussed. (Auth.)

F-52290

Azuma, N., Goto-Azuma, K., Nakawo, M., **Photometric analysis of a 100 m ice core from Asuka Camp, East Antarctica: pre-**

liminary results, *Bulletin of glacier research,* Aug. 1994, No.12, p.69-75, 5 refs.

Reflective light intensity was measured continuously on a vertically split flat surface of a 100 m ice core from Asuka Camp, East Antarctica with a newly developed photometric device for rapid stratigraphic analyses. The data obtained by the photometric measurement were compared with the density data and visual stratigraphy. The reflectivity and its standard deviation showed good correlations with density and grain size respectively at the shallower part of the core. This fact suggests that the new photometric method provides stratigraphic information such as the degree of depth hoar development and indications of annual boundaries in the core. (Auth. mod.)

F-52291

Oerter, H., ed, **Filchner-Ronne Ice Shelf Programme, Report No.8 (1994),** Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1994, 48p., Refs. passim. For individual papers see 49-3174 through 49-3182 or F-52292 through F-52300.

This report contains 10 written summaries of talks presented at the 9th International Workshop of the Filchner-Ronne Ice Shelf Programme (FRISP). The meeting was held at Bergen, Norway, on June 5-6, 1994. The papers collected in this volume present an overview of FRISP and of the cooperation of participating groups. ERS-1 data, used for the determination of special surface features and ice velocities, are included in the report, as are accumulation studies over long distances by means of airborne radar measurements in Queen Maud Land.

F-52292

Blindow, N., **Reflection amplitudes of 40 MHz monopulse radio echo sounding: correlation with ice core data and ice dynamics,** Filchner-Ronne Ice Shelf Programme, Report No.8 (1994), edited by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1994, p.5-8, 9 refs.

Correlation of radio echo sounding data and core data is addressed with some notes on forward modelling and inversion of electromagnetic reflection data, and a description of the application of forward modelling. Some aspects of radio echo sounding amplitudes and ice dynamics are discussed.

F-52293

Corr, H., Popple, M., **Airborne radio echo sounding on the Evans flowline, Ronne Ice Shelf,** Filchner-Ronne Ice Shelf Programme, Report No.8 (1994), edited by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1994, p.9-11, 3 refs.

Jan. of 1994 saw the first antarctic deployment of a new airborne radio echo system. The radar flew for some 70 hours on dedicated glaciological work and 30 hours in support of an aero-gravity campaign. A figure shows the flight tracks of 8 sorties, representing 24 flying hours, from the remote field camps of Ski-Hi and Haag Nunataks.

F-52296

Gerland, S., Kipfstuhl, J., Graf, W., Minikin, A., **Non-destructive high resolution density measurements of the B15 ice core,** Filchner-Ronne Ice Shelf Programme, Report No.8 (1994), edited by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1994, p.24-28, 5 refs.

Density is one of the basic physical properties of ice. It can be determined conventionally by the principle of Archimedes and weighing. A non-destructive method is based on the attenuation of gamma rays. Here the authors present density data of the upper 165 m of the B15 ice core drilled in the central Filchner-Ronne Ice Shelf in 1992.

F-52297

Holmlund, P., Richardson, C., **Snow radar measurement of the accumulation gradient from the coast to 3000 m elevation, Dronning Maud Land,** Filchner-Ronne Ice Shelf Programme, Report No.8 (1994), edited by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1994, p.29-35.

Snow layers have successfully been mapped in Queen Maud Land by using a snow radar system along two traverses from the coast up to 3000 m elevation. The recordings show large variations in accumulation pattern along the 2300 km measured profiles. These traverses were part of the Swedish contribution to the International Trans-Antarctic Scientific Expedition (ITASE). The snow radar used is a continuous wave step-frequency radar based on a Hewlett-Packard Network Analyzer (8753C). Data was stored on an IBM 486 computer and later on optical discs. The snow radar was operated in the frequency range 800-2300 MHz by using a pair of AEL APN-106AA antennae. The equipment was installed in, and operated from, a Hägglunds terrain carrier. The snow radar data will be calibrated by using snow core data sampled during this expedition, where annual layers will be separated by analyzing the oxygen isotope ratio. Conversely, snow radar recordings will be used to interpolate data between borehole sites. (Auth.)

F-52298

Jenkins, A., Vaughan, D.G., Doake, C.S.M., **Numerical modelling of Filchner-Ronne Ice Shelf,** Filchner-Ronne Ice Shelf Programme, Report No.8 (1994), edited by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1994, p.36-38, 2 refs.

A version of the two-dimensional, depth-integrated finite element model described by MacAyeal and Thomas (1982) has been applied to the Filchner-Ronne Ice Shelf. The version of the model currently in use has no time dependency; it simply solves the equations describing the balance of horizontal stresses, given a distribution of ice thicknesses, to yield ice velocity vectors. The elliptical partial differential equations require boundary conditions all around the model domain. At the grounded margins of the ice shelf, velocity magnitudes and directions are specified, while sea water pressure provides the boundary condition at the ice front. An ice hardness parameter must also be specified at all points in the domain, and this is derived from a nominal temperature profile at each point. The solution procedure requires iteration until the ice viscosity, a function of the effective strain rate as well as the specified hardness, is consistent with the computed velocity field.

F-52299

Mayer, C., Huybrechts, P., **Ekström grounding line experiments—first results,** Filchner-Ronne Ice Shelf Programme, Report No.8 (1994), edited by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1994, p.39-44, 1 ref.

During the 1993-94 season a detailed study of ice dynamics and mass balance was carried out in the southern grounding line zone of the Ekström Ice Shelf. The experiments aimed at collecting enough data on topography, ice thickness, ice velocity and surface deformation along a flowline across the assumed grounding line to be able to determine the stress- and strain rate conditions in a vertical plane across the transition zone. These data will then form the basis for a modeling study focusing on this crucial area of the ice sheet-ice shelf system. Such a study should provide valuable insight into the dynamics of the transition zone between grounded and floating ice.

F-52300

Sandhäger, H., Thyssen, F., **Two-dimensional modelling of stress fields in selected cross sections of Filchner-Ronne-Schelfeis (Antarctica),** Filchner-Ronne Ice Shelf Programme, Report No.8 (1994), edited by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1994, p.45-47, 7 refs.

Results are given of several applications of two-dimensional modellings to different selected cross sections of the central part of FRIS. These show that in most cases the simulated stress fields within the cross sections can explain the formation of the observed pattern of fractures in close vicinity to the sections. However, the model investigations also point to the fact that on the one hand in those ice shelf areas where the ice dynamic courses only can be recorded three-dimensionally, limited statements about the real stress conditions in the ice can be deduced from the results of the two-dimensionally vertical model calculations.

F-52321

Cooper, A.P.R., **Simple shape-from-shading algorithm applied to images of ice-covered terrain,** *IEEE transactions on geoscience and remote sensing,* Nov. 1994, 32(6), p.1196-1198, 10 refs.

Snow surfaces in the polar regions have uniform reflecting properties over large areas. Slopes are usually low; in Antarctica, they rarely exceed 2° except in mountainous regions. Such low slopes permit simplification of the scattering law, allowing the use of an efficient algorithm for extracting height information from images. (Auth.)

F-52329

Legrand, M., **Ice core chemistry: implications for our past atmosphere,** NATO Advanced Study Institute on Low-temperature Chemistry of the Atmosphere, Maratea, Italy, Aug. 29-Sep. 11, 1993. Proceedings. Edited by G.K. Moortgat et al and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.21, Berlin, Springer-Verlag, 1994, p.421-445, 56 refs.

DLC QC879.6.L69

This paper presents the state-of-the-art in glaciochemistry studies, focusing mainly on the soluble mineral and organic species. Also included is a brief presentation of how ice core dating can be established and of difficulties connected with trace measurements. Also discussed are the basics of the ionic composition of snow (achievement and significance) plus origins and sources of impurities in polar regions; the significance of such records obtained in various areas (coastal as well as central areas of Greenland and Antarctica) which span various time periods (from the last decades back to last climatic cycle); and the glaciochemistry of primary (sea salt and soil dust) and secondary aerosols (e.g. aerosol produced during gas conversion, in particular sulphur derived species) and of some reactive gases such as HNO_3, H_2O_2, and organic acids. (Auth. mod.)

F-52330

Legrand, M., Raynaud, D., Barnola, J.M., Chappellaz, J., **Trends in global distribution of trace gases inferred from polar ice cores,** NATO Advanced Study Institute on Low-temperature Chemistry of the Atmosphere, Maratea, Italy, Aug. 29-Sep. 11, 1993. Proceedings. Edited by G.K. Moortgat et al and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.21, Berlin, Springer-Verlag, 1994, p.447-464, 36 refs.

DLC QC879.6.L69

This paper discusses ice dating problems and to what extent the composition of the air enclosed in the bubbles of the ice represents a good record of past atmospheric trace gas concentrations. Most of the information extracted from ice cores has been obtained over the last 10 years and the best documented records are for CO_2 and CH_4. These records span various time periods including the last decades and the pre-industrial time back to the last climatic cycle (160,000 years). Included is a discussion of the implications of these ice records in terms of coupled relation "biosphere-atmosphere-climate". (Auth. mod.)

F-52416

Askebjer, P., et al, **Optical properties of the South Pole ice at depths between 0.8 and 1 kilometer,** *Science,* Feb. 24, 1995, 267(5201), p.1147-1150, 17 refs.

The optical properties of the ice at the geographical South Pole have been investigated at depths between 0.8 and 1 km. The absorption and scattering lengths of visible light (515 nm) were measured in-situ with the use of the laser calibration setup of the Antarctic Muon and Neutrino Detector Array (AMANDA) neutrino detector. The ice is intrinsically extremely transparent. The measured absorption length is 59 m, comparable with the quality of the ultrapure water used in the Irvine-Michigan-Brookhaven and Kamiokande proton-decay and neutrino experiments and more than twice as long as the best value reported for laboratory ice. Because of the residual density of air bubbles at these depths, the trajectories of photons in the medium are randomized. If the bubbles are assumed to be smooth and spherical, the average distance between collisions at a depth of 1 km is about 25 cm. The measured inverse scattering length on bubbles decreases linearly with increasing depth in the volume of ice investigated. (Auth.)

F-52422

Paterson, W.S.B., **Physics of glaciers. 3rd edition,** Oxford, Elsevier Science Ltd., 1994, 480p., Refs. passim. For previous editions see 35-4009/12F-25038 and 25-108/5F-952.

The aim of this book and the level of treatment remains unchanged from earlier editions. The text has, however, been completely revised in order to keep pace with the extensive developments since the second edition was published. Changes in structure include a new chapter about the deformation of subglacial till, a previously neglected topic that is now of major interest, and reorganization of the chapters about flow in the different types of ice mass. Lack of space has forced the elimination of the chapter on measurement techniques and is also the reason for the continued absence of any discussion of glacial erosion and sedimention. (Auth. mod.)

F-52424

U.S. Ice Core Research Workshop, Durham, NH, June 13-17, 1988, **Compiled reports,** Durham, University of New Hampshire, 1988, 74p.

From June 13-17, 1988 a National Science Foundation Division of Polar Programs-sponsored workshop entitled "The U.S. Ice Core Research Workshop" was held in Durham, NH. The Workshop brought together a relatively large number (42) of U.S. researchers interested in ice core research and representatives of the European ice core research community. The purpose of the Workshop was to develop a consensus on the direction of U.S. ice core research through the 1990s. Emphasis was placed on the newest major proposed U.S. deep drilling effort, GISP II (Greenland Ice Sheet Project II) and the development of a global strategy for U.S. ice core research to include deep drilling efforts not only in Greenland but also in Antarctica, plus shallow-to intermediate-core recovery programs at low, middle and high latitudes sites. Results of the workshop are presented here. (Auth. mod.)

F-52426

Phillips, H.A., Laxon, S.W., **Tracking of antarctic tabular icebergs using passive microwave radiometry,** *International journal of remote sensing,* Jan. 20, 1995, 16(2), p.399-405, 16 refs.

Passive microwave images of Antarctica from the Special Sensor Microwave Imager (SSM/I) were used to track giant tabular icebergs that originated from the Larsen ice shelf in 1986. Since microwave radiation is relatively insensitive to weather and unaffected by lighting conditions, the SSM/I instrument provides all-weather, year-round viewing. The icebergs are visible almost every day, giving an ideal temporal resolution for tracking their motion. One of the icebergs was tracked until Oct. 1988, six months after its last position noted in the Navy/NOAA Joint Ice Centre ice charts. The tracks of both icebergs reveal motion in agreement with observed oceanographic currents and eddies. (Auth. mod.)

F-52440

Palais, J.M., Spencer, M.J., Chuan, R.L., **Glaciochemical studies of aerosol fallout from Mount Erebus,** *American Geophysical Union. Antarctic research series,* 1994, Vol.66, Volcanological and environmental studies of Mount Erebus, Antarctica. Edited by P.R. Kyle, p.115-128, Refs. p.127-128.

Six snow pits were sampled on and around Ross I. and analyzed for major cations, anions, microparticles and oxygen isotopes to assess the geochemical impact of Mount Erebus on the local atmosphere and snow chemistry. The sources, background concentrations and seasonal variations of impurities in the snow around Erebus have been evaluated. Although there is some evidence that emissions from Erebus affect the chemistry of snow at sites on and around Ross I., the volcanic signature is not unambiguous. Chloride and sulfate found in the snow are the most characteristic products emitted from Mount Erebus. (Auth.)

F-52446

Arcone, S.A., Delaney, A.J., Tobiasson, W., **Subsurface radar investigations at the Pegasus Glacial-Ice Runway and Will-**

iams Field, McMurdo Station, Antarctica, *U.S. Army Cold Regions Research and Engineering Laboratory. Report,* Nov. 1994, 23p., ADA-289 232, 29 refs.

Subsurface radar was used to profile ice and snow conditions on the Ross Ice Shelf at McMurdo Station during mid-Jan. 1993. Deconvolution and migration were often used to improve vertical resolution and spatial imaging. Profiles at a pulse center frequency of 400 MHz along the 3.2-km long Pegasus ice runway show many low-density horizons above 9 m depth that are up to 30 m long. They are associated with air bubbles included during refreezing of meltwater and are interpreted as layers between a few to tens of centimeters thick. There is a strong reflecting horizon at about 9 m depth that is probably from brine intrusion, as it is continuous with the intrusion into the snow to the east. Diffraction asymptotes give a dielectric constant near 3.2 for material above the brine level, a value that implies near-solid ice. Profiles at 100 MHz along the road between Pegasus runway and Williams Field in the accumulation zone show snow features such as layer deformation and intrusive brine layers that both abruptly and gradually change in depth. A single profile at a relic solid waste dump at Williams Field detected buried debris and ice within the upper 7 m. A survey of a suspected fuel spill shows some local disturbances near the center, but no excavation was done to verify the findings. Profiles traversing the sewage sumps at Williams Field outline the extent of the sewage deposition, and give depths to contaminated snow that closely agree with observations. Despite variability in dielectric properties, single-layer migration effectively improves the resolution of subsurface conditions. Recommendations are made for future surveys. (Auth.)

F-52464

Markus, T., Burns, B.A., **Method to estimate subpixel-scale coastal polynyas with satellite passive microwave data,** *Journal of geophysical research,* Mar. 15, 1995, 100(C3), p.4473-4487, 29 refs.

This paper presents a method to estimate the open water area in subpixel-scale antarctic polynyas from passive microwave data. To quantify systematic errors, the method is applied to synthetic satellite images with known polynya geometry and brightness temperature statistics. In addition, a comparison with high-resolution synthetic aperture radar (SAR) and infrared data is carried out to determine the maximum ice thickness included in the area estimates and the influence of clouds on the results, especially because of the use of 85 GHz. To examine small changes in polynya area, the method is applied to a data time series and the results interpreted with the aid of a model which describes the development of wind-driven coastal polynyas. (Auth. mod.)

F-52465

Mel'nikov, I., ***In situ* experimental study of young sea ice formation on an antarctic lead,** *Journal of geophysical research,* Mar. 15, 1995, 100(C3), p.4673-4680, 26 refs.

A multidisciplinary study of the sea ice during the joint U.S.-Russian Expedition on Ice Station Weddell 1 (ISW 1) provided an excellent opportunity to examine ice dynamics, the microbiological community, and the nature and rates of biotic processes during initial ice formation and colonization of lead ice. This paper presents hourly, daily, and monthly observations of physical, chemical, and biological processes during the formation and growth of young sea ice in austral autumn. These observations were taken in a region of perennial ice in the western Weddell Sea during the drift of ISW 1 from 72 to 65°S and 51 to 53°W. (Auth. mod.)

F-52466

Dierking, W., **Laser profiling of the ice surface topography during the Winter Weddell Gyre Study 1992,** *Journal of geophysical research,* Mar. 15, 1995, 100(C3), p.4807-4820, 32 refs.

As part of the Winter Weddell Gyre Study 1992, several surface elevation profiles were measured from R/V *Polarstern* using a helicopter as a remote sensing platform. The measurements covered the areas from 69 to 72°S and 0 to 20°W and from 59 to 66°S and 33 to 51°W. From the laser profiler data the statistical properties of the ice surface roughness in the Weddell Sea during austral winter were determined. In this paper the results are described, and the use of laser data in studies of ice accumulation and of atmospheric forcing on the pack ice is discussed. (Auth. mod.)

F-52467

Andreas, E.L., Claffey, K.J., **Air-ice drag coefficients in the western Weddell Sea. 1. Values deduced from profile measurements,** *Journal of geophysical research,* Mar. 15, 1995, 100(C3), p.4821-4831, 40 refs.

From 197 hourly averaged, four-level wind-speed profiles collected on Ice Station Weddell (ISW) in Feb. and Mar. 1992, the authors compute the neutral stability, 10 m, air-drag coefficient, C_{DN10}. Values range from 1.3×10^{-3} to 2.5×10^{-3} for the multiyear ice floe that was ISW. Individual C_{DN10} values depend critically on how well the mean wind is aligned with the dominant snowdrift patterns. On ISW, 20% of the time there was drifting or blowing snow; when the wind speed at 5 m exceeded 8 m/s, such wind-driven snow was a virtual certainty. Consequently, the surface was continually changing, drifts were building and eroding. As the wind continued from a constant direction and the building drifts streamlined the surface, C_{DN10} could decrease by as much as 30% in 12 hours. If the wind direction then shifted by as little as 20°, C_{DN10} would immediately increase significantly. The implications are that snow-covered sea ice does not present an isotropic surface; it has a preferred direction dictated by the wind's history. Consequently, computing surface stress using an average value for C_{DN10} will produce errors of up to 30%. (Auth. mod.)

F-52468

Andreas, E.L., **Air-ice drag coefficients in the western Weddell Sea. 2. A model based on form drag and drifting snow,** *Journal of geophysical research,* Mar. 15, 1995, 100(C3), p.4833-4843, 32 refs.

To investigate behavior of the neutral stability air-ice drag coefficient at a reference height of 10 m (C_{DN10}), the author adapts a model developed by Raupach (1992) that partitions the total surface stress into contributions from form drag and skin friction. An essential part of this development was extending Raupach's model to the more complex geometry of sastrugi-like roughness elements. Assuming that 10 cm high sastrugi cover 15% of the surface, this physically based model reproduces the three main observations listed above. Thus the model seems to include the basic physics of air-ice momentum exchange. The main conclusion from this modeling is that 10 cm, sastrugi-like snowdrifts, rather than pressure ridges, sustain most of the form drag over compact sea ice in the western Weddell Sea. Secondly, the model suggests that skin friction accounts for about 60% of the surface stress when the wind is well aligned with the sastrugi; but when the wind is not well aligned, form drag accounts for about 80% of the stress. The sastrugi are thus quite effective in streamlining the surface. (Auth. mod.)

F-52509

Shabtaie, S., Bentley, C.R., **Electrical resistivity sounding of the East Antarctic ice sheet,** *Journal of geophysical research,* Feb. 10, 1995, 100(B2), p.1933-1954, 60 refs.

Electrical resistivity soundings using a Schlumberger array have been carried out at Dome C, East Antarctica to sound the entire 3500-m depth of the ice sheet. Changes in density and temperature are largely separated in the ice at Dome C, so activation energies for both firn and ice could be determined: an activation energy of 0.25 eV in both solid ice and firn between -15°C and -58°C was found. A common value of the activation energy points to a single transport regime in which the charge carriers and conduction paths are the same in firn and ice. To evaluate the variation of resistivity with density, five dielectric mixture models that fit the available data on the high-frequency dielectric constant of firn are considered. In the upper 900 m of the ice sheet, where impurity concentrations are known from core samples, no correlation between resistivities and the concentrations of salts or acids is found. It is likely that resistivities are correlated with the crystal size, hence with the Holocene-Wisconsin boundary in the ice column. (Auth. mod.)

F-52531

Benjamin, D., Bougere, J., **Glacier retreat and morphodynamic changes at the southeast margin of Cook Glacier (Kerguelen, subantarctic)** [Le retrait glaciaire et les modifications morphodynamiques dans la marge s-e du glacier Cook (Kerguelen, taaf)], *Zeitschrift für Geomorphologie,* Dec. 1994, 38(4), p.475-486, In French with English and German summaries. 20 refs.

The retreat of Cook Glacier has been measured by aerial photographs, field photographs, and mapping of topography for the period of 1962 to 1991. During this time different glacier tongues, Dufour, Jussieu, Périer and Diosaz, disappeared and all glacier fronts retreated. The rapidity of this retreat varies as a function of height, mass budget of the glacier, distance to the center of the ice cap and the presence of a proglacial lake. In the case of Ampère glacier there is a frontal retreat of about 2.5 km since 1962 with a variable rapidity of retreat: 35 m/a from 1962 to 1974, 125 m/a from 1975 to 1983 and 100 m/a from 1984 to 1991. The common retreat of the glacier fronts leads to the hypothesis of a rise in temperature, in spite of the absence of meteorological data over a longer period. (Auth. mod.)

F-52537

Bintanja, R., Van den Broeke, M.R., **Surface energy balance of antarctic snow and blue ice,** *Journal of applied meteorology,* Apr. 1995, 34(4), p.902-926, 40 refs.

Little is known about the surface energy balance of antarctic blue-ice areas, although there have been some studies of the energy balance of snow surfaces. Therefore, a detailed meteorological experiment was carried out in the vicinity of a blue-ice area in the Heimefront Range, Queen Maud Land, during the austral summer of 1992-93. Since not all the surface fluxes could be measured directly, the use of a model was necessary. The main purpose of the model is to calculate the surface and subsurface temperatures from which the emitted longwave radiation and the turbulent fluxes can be calculated. The surface energy balance was evaluated at four locations: one on blue ice and three on snow. Differences are due mainly to the fact that ice has a lower albedo (0.56) than snow (0.80). To compensate for the larger solar absorption of ice, upward fluxes of longwave radiation and turbulent fluxes are larger over ice. Moreover, the energy flux into the ice is larger than into snow due to the differences in the radiative and conductive properties. Surface temperatures, snow subsurface temperatures, and ice sublimation rates evaluated with the model compare well with the measurements, which yields confidence in the surface energy balance results. (Auth.)

F-52538

Casassa, G., Turner, J., **Dynamics of the Ross Ice Shelf,** *Eos,* Oct. 29, 1991, 72(44), p.473, 481, 11 refs.

The Ross Ice Shelf in its entirety was examined in 1991 using Advanced Very High Resolution Radiometer data. A new glaciological feature provided the most thought-provoking aspect of this high altitude survey: flow stripes on Byrd Glacier, Ice Streams D and E, and Crary Ice Rise. It is concluded that the stripes are relict ice flow features produced by increased ice stream activity at the time the stripes were formed.

F-52547

Paganelli, A., **Aspects of some chemical parameters of ice and snow in the antarctic continent,** Meeting on Antarctic Biology, 2nd, Padova, Italy, Feb. 26-28, 1992. Proceedings. Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1944, p.77-81, With Italian summary. 7 refs.

Forty-three samples of water from ice and snow from different areas of Victoria Land, collected during the Italian antarctic expeditions of 1989-90 and 1990-91, were analyzed. The following chemical parameters were determined: conductivity, pH, total phosphorus, reactive phosphorus, nitric nitrogen and ammoniacal nitrogen. Tabulated results are presented.

F-52566

Kudriashov, B.B., Menshikov, N.G., **Ice core hot-fluid drilling,** *Antarctic record,* 1994, 38(3), p.193-198, With Japanese summary. 4 refs.

Fast hole production is possible using ice core hot-fluid drilling. The present paper describes a method for calculation of drill penetration rate dependent on the fluid flux, fluid temperature, physical properties of fluid, size of hot-fluid drill head and properties of the ice. The design and description of an experimental model of an ice core hot-fluid drill and the experimental data obtained are given. Calculated and measured rates of the drill penetration are compared. (Auth.)

F-52568

Kamiyama, K., Watanabe, O., **Substances deposited on an inland plateau, Antarctica,** *Antarctic record,* 1994, 38(3), p.232-242, In Japanese with English summary. 17 refs.

Various substances are transported over the inland plateau of Antarctica through the atmosphere and deposited onto the snow surface. The chemical composition of the snow reflects the transportation process and the amounts of the substances present in the atmospheric environment. In this report, investigations on the snow chemistry on the inland plateau are briefly reviewed. The concentrations of some substances, for example tritium, have increased. This was produced both by the local effect over the inland plateau, caused by the extremely low temperature air mass, and by the global circulation through the stratosphere, which transports substances directly from remote areas. By considering the special chemical features of the accumulated snow in the interior of the antarctic continent, one can more effectively interpret ice and snow cores in the study of the global atmospheric environment. (Auth. mod.)

F-52578

Grosfeld, K., Blindow, N., Thyssen, F., **Bottom melting on the Filchner-Ronne Ice Shelf, Antarctica, using different measuring techniques,** *Polarforschung,* 1992 (Publ. 1994), 62(2/3), p.71-76, With German summary. 13 refs.

During the 1989-90 field season on Filchner-Ronne Ice Shelf special interest was focussed on the examination of the bottom-melting rate by different measuring techniques. Access to the sea water underneath the ice shelf was gained by means of hot-water drillings. The installation of temperature cable and TDR-sensor lines yielded a distinct value of the bottom mass-balance parameter after re-measurement in 1992. In addition a seasonal dependence for bottom melting is indicated. The results of the long-term observation conform with a mass-balance study performed in the same region from surface-based measurements in the same season. The influence of tidal-induced ice shelf/ocean interaction with regard to bottom melting can be derived from a continual registration of sea-water temperatures. (Auth.)

F-52580

Zeibig, M., Delisle, G., **Drilling into antarctic ice - the new BGR ice drill,** *Polarforschung,* 1994 (Publ. 1992), 63(2/3), p.147-150, With German summary. 6 refs.

Described here is a new ice drill consisting of an electrically heated probe that melts its way through the ice. The meltwater produced is recovered periodically with a bailer. The instrument is mounted in a closed container on a sledge and is operable irrespective of weather conditions. Forty-eight boreholes in antarctic ice have been drilled so far in two seasons by this system. The deepest hole reached 102 m. (Auth.)

F-52607

Østerhus, S., Orheim, O., **Oceanographic and glaciologic investigations through Jutulgryta, Fimbulisen in the 1991/92 season,** *Norsk Polarinstitutt. Meddelelser,* 1994, No.124, Report of the Norwegian Antarctic Research Expedition 1991/1992. Edited by S. Østerhus, p.21-28, 2 refs.

A long-term program to investigate conditions underneath antarctic ice shelves was initiated by NARE 1989-90. The first stage of this program was the deployment of sub-ice instruments in Queen Maud Land to test various concepts and obtain data from a medium-size ice shelf. The long-term objective was to deploy such recording instruments underneath the Filchner-Ronne Ice Shelf. The instrument rig was deployed on Feb. 10, 1990. The thickest fragments of ice shelf were 2-300 m thick, but the instrument rig was deployed in a fissure through 11.1 m of solid ice, which was underlain by 27 m of slush. The latter indicated rapid freezing conditions at this site, perhaps mainly caused by advection of supercooled water. The rig contained altogether 39 sensors. Details of recovery of instruments and data recorded in 1990-1992 are presented in tables.

F-52608

Solheim, A., **Proximal sub ice-shelf sedimentation, Jutulgryta, East Antarctica,** *Norsk Polarinstitutt. Meddelelser,* 1994, No.124, Report of the Norwegian Antarctic Research Expedition 1991/1992. Edited by S. Østerhus, p.29-33, 13 refs.

A small coring and sea floor photography program was carried out in Jutulgryta with the following main objectives: to obtain cores of up to 2.4 m length (restricted by equipment) and sea floor photographs from a series of closely spaced locations during the period of occupation of the field camp; to investigate the nature of sedimentation in this sub ice-shelf environment relatively close to the grounding line, particularly sediment composition and sedimentation rates; to study possible grounding line fluctuations and other paleoclimatic events through biostratigraphy. Data processing and preliminary results are discussed.

F-52609

Gjessing, Y., Erlingsson, B., **Chemical fractionation of sea salt in snow,** *Norsk Polarinstitutt. Meddelelser,* 1994, No.124, Report of the Norwegian Antarctic Research Expedition 1991/1992. Edited by S. Østerhus, p.35-41, 5 refs.

The purpose of this project is a detailed study of the relation between the excess-deficit of sulfate in snow vs. distance from the coast in the Riiser-Larsen Ice Shelf area. Snow samples were collected every 1 km from the shelf edge to 5 km inland, and every 5 km over the next 40 km. Further inland samples were collected every 20 km. The maximum of the total concentrations of ions of marine origin is found 2-3 km inland from the shelf edge. As expected, further inland the concentrations decrease with distance from the shelf edge. There is a close correlation between the ions except for the surface layer, which shows only a weak correlation between sulfate and the other ions. The comparatively low concentrations near the shelf edge are probably due to wind transport to the sea of the surface snow by the prevailing katabatic winds.

F-52610

Erlingsson, B., Gjessing, Y., Hamran, S.E., Holmlund, P., **Detailed studies of bottom freezing under an ice shelf and mapping of accumulation by use of multi-frequency pulse-aperture radar,** *Norsk Polarinstitutt. Meddelelser,* 1994, No.124, Report of the Norwegian Antarctic Research Expedition 1991/1992. Edited by S. Østerhus, p.43-46, 5 refs.

The radar system used in this study is a step frequency radar or a synthetic pulse radar collecting 201 frequencies at equidistant steps over the desired bandwidth. Radio echo soundings were carried out on the 100 km profile from the grounding line of the Riiser-Larsen Ice Shelf to the ice front. Bottom topography of the inner part, and bottom profile of the outermost part of the ice shelf, are shown in figures and discussed.

F-52612

Hutter, K., Blatter, H., Ohmura, A., **Climatic changes, ice sheet dynamics and sea level variations,** *Zürcher Geographische Schriften,* 1990, No.37, 83p., WDCA 93000221, With German summary. Refs. p.75-83.

This report is an attempt to demonstrate that there is a coherent interplay among global ice sheet dynamics, the greenhouse effect and sea level. Ice sheets do respond to climatic variations, but their modes of operation depend on whether they are grounded or afloat. Response times of the former are 10 kyrs, those of the latter are 1 kyr or shorter. Peculiar features are exhibited by the grounding zones of marine ice-sheets. The issue of the stability or instability of the West Antarctic Ice Sheet is regarded as still open. The prediction of the future sea level does not only depend on a clear answer to this stability issue but equally also on many other factors such as the movement of the Earth's crust, the change in density of sea water with temperature, the global mass balance of glaciers and ice sheets, and—very significant and least understood—the residence time of the water in the various components of the hydrological cycle. A sea level forecast for the year 2088 and based on a doubling or quadrupling of the atmospheric CO_2-content will depend on all these factors. (Auth. mod.)

F-52613

Ridley, J.K., Bamber, J.L., **Antarctic field measurements of radar backscatter from snow and comparison with ERS-1 altimeter data,** *Journal of electromagnetic waves and applications,* 1995, 9(3), p.355-371, 8 refs.

Two identical Ku band scatterometers were deployed at a number of locations in the region of the Filchner-Ronne Ice Shelf during the austral summer '91-92. These were used to investigate the vertical incidence radar properties of the top 10 m of firn; these measurements were compared with those made by the ERS-1 radar altimeter over the region. The radar backscatter coefficient on the ice shelf was found to remain constant over a period of 18 days, but the value differed significantly from that obtained on the nearby Coats Land plateau. Field measurements, coincident with ERS-1 overpasses, were made throughout a 4-week field season during the three-day repeat cycle of the 'Ice Phase' of the satellite's operation. These show spatial agreement with the ERS-1 altimeter backscatter coefficient to within 1dB. (Auth. mod.)

F-52614

Hosseinmostafa, A.R., Lytle, V.I., Jezek, K.C., Gogineni, S.P., Ackley, S.F., Moore, R.K., **Comparison of radar backscatter from antarctic and arctic sea ice,** *Journal of electromagnetic waves and applications,* 1995, 9(3), p.421-438, 11 refs.

Backscatter measurements were made at C band (5.3 GHz) over sea ice in the Weddell Sea from the German research vessel F.S. *Polarstern* during Sep. and Oct., 1989. Data were acquired on first-year (FY) and second-year (SY) snow-covered sea ice at stations where the ship stopped and detailed snow and ice characterizations were performed. Data were collected at incidence angles from 30° to 75° with all four linear polarizations. The results showed that the presence of slush at the snow-ice interface effectively masked the distinction between FY and SY ice in the Weddell Sea. Perhaps more importantly, it was found that it is possible to distinguish slush-covered and slush-free FY ice floes, depending on incidence angle. It was found that scattering from roughened slush-free ice was stronger than slush-covered ice at large incidence angles. At small incidence angles, quasi-specular reflection from slush-covered ice dominated the radar signal. The results further indicated that the volume scattering from the snow and from the ice was small at up to 50° angle of incidence. (Auth. mod.)

F-52615

Rémy, F., Féménias, P., Ledroit, M., Minster, J.F., **Empirical microwave backscattering over Antarctica: application to radar altimetry,** *Journal of electromagnetic waves and applications,* 1995, 9(3), p.463-474, 17 refs.

In order to validate satellite altimeter measurements over Antarctica, the Seasat scatterometer backscatter coefficient which has been measured at different incidence and azimuth angles and for the two polarizations is analyzed. The authors show that the signal at large incidence angles is a mixed signal of volume, backscattered by subsurface layering and surface scattering whose proportions depend on physical characteristics of the snow. Only the effect of the volume scattering by spherical grains on the altimetric signal can be estimated: it is of the order of a few percent of the total altimetric signal and the induced height error is less than 25±20 cm if the echo is properly retracked. Other effects such as internal density boundary are not estimated. (Auth. mod.)

F-52618

Andersen, D.T., et al, **Preliminary comparison of two perennially ice-covered lakes in Antarctica: analogs of past Martian lacustrine environments,** *Advances in space research,* Mar. 1995, 15(3), Life Sciences and Space Research XXV (4): Planetary Biology and Origins of Life. Proceedings of the Topical Meeting of the COSPAR Interdisciplinary Scientific Commission F (Meeting F3) of the COSPAR Twenty-ninth Plenary Meeting held in Washington, DC, USA, 28 August-5 September, 1992, p.(3)199-(3)202, 17 refs.

Perennially ice-covered lakes in the Antarctic have been suggested as analogs to lakes which may have existed on the surface of Mars 3.5 billion years ago. During the 1991-1992 austral summer, a joint Russian/American research effort was directed at studies of ice-covered lakes in the Bunger Hills Oasis. The primary objective of the expedition was to investigate this ice-free area for features analogous to ancient Martian environments that may have been capable of supporting life, and to compare the ice-covered lakes of the Bunger Hills with those in the McMurdo Dry Valleys as part of the continuing studies of Antarctica-Mars analogs. (Auth.)

F-52634

Zwally, H.J., Fiegles, S., **Extent and duration of antarctic surface melting,** *Journal of glaciology,* 1994, 40(136), p.463-476, 13 refs.

The extent and duration of surface melting on the antarctic ice shelves and margins of the antarctic ice sheet are derived from satellite passive microwave data for 1978-87. The occurrence of surface melting in daily maps is indicated by a marked increase in microwave brightness temperature (T_b), which is caused by moisture in the near-surface firn. T_b increases of more than 30° above the annual-mean T_b are chosen to indicate melting. Most antarctic surface melting occurs during Dec. and Jan. The observed melting is correlated with regional air temperatures, but some melt patterns also appear to be related to katabatic wind effects. The correlations suggest that the surface melting in Antarctica increases about 3.5×10^6 d km^2 per degree of summer temperature increase. The surface-melt index calculated for Antarctica is 24×10^6 d km^2, averaged over nine summers. The observed inter-annual and regional variability is large. Surface melting was most extensive during the 1982-83 summer and least extensive during the 1985-86 summer. (Auth. mod.)

F-52635
Echelmeyer, K.A., Harrison, W.D., Larsen, C., Mitchell, J.E., **Role of the margins in the dynamics of an active ice stream,** *Journal of glaciology,* 1994, 40(136), p.527-538, 30 refs.

The present paper describes measurements made on Ice Stream B, which are directed at the problem of the margins and their role in controlling ice-stream flow. Measurements of surface velocity were made along a transverse profile extending from near the center of the ice stream across the shear margin and into the slow-moving ice sheet. These observations are discussed in terms of flow models which indicate that the margins do play an important role in controlling ice-stream motion, with marginal drag being equal to or greater than basal drag at some locations. (Auth. mod.)

F-52636
Price, P.B., **Kinetics of conversion of air bubbles to air hydrate crystals in antarctic ice,** *Science,* Mar. 24, 1995, 267(5205), p.1802-1804, 20 refs.

The depth dependence of bubble concentration at pressure above the transition to the air hydrate phase and the optical scattering length due to bubbles in deep ice at the South Pole are modeled with diffusion-growth data from the laboratory, taking into account the dependence of age and temperature and depth in the ice. The model fits the available data on bubbles in cores from Vostok and Byrd and on scattering length in deep ice at the South Pole. It explains why bubbles and air hydrate crystals coexist in deep ice over a range of depths as great as 800 m, and predicts that at depths below ca. 1400 m the AMANDA neutrino observatory at the South Pole will operate unimpaired by light scattering from bubbles. (Auth.)

F-52642
Wamser, C., Lykossov, V.N., **On the friction velocity during blowing snow,** *Contributions to atmospheric physics,* Feb. 1995, 68(1), p.85-94, With German summary. 13 refs.

Snow concentration and wind profile measurements made during the Byrd Snow Drift Project in the western Antarctic are the basis of the investigation in this paper. It is shown that during episodes of snow drift, which is a common feature in Antarctica, the influence of drifting snow particles on the density stratification cannot be neglected in studies of turbulence parameters. A new approach is introduced by which these effects on the friction velocity can be described. It is shown that generally snowdrifts near the surface lead to a significant stabilizing of the surface layer and a corresponding drag reduction. Inclusion of this effect results in an improved formulation of the snow drift densities. Comparison between calculations and observations are presented. (Auth.)

F-52655
Cini, R., Petronio, B.M., Degli Innocenti, N., Stortini, A.M., Braguglia, C., Calace, N., **Fulvic acids in the antarctic snow "via marine aerosol",** *Annali di chimica,* 1994, Vol.84, p.425-430, 11 refs.

Fulvic acids were found for the first time in antarctic snow in the summer of 1990-91 on Mt. Melbourne at an elevation of 1130 m a.s.l, and again in the summer of 1993-94 also on Mt. Melbourne at 200 m a.s.l. The FTIR spectra of the fulvic acids extracted from the snow samples were very similar to fulvic acids extracted from sea water samples, indicating that the fulvic acids in the snow were transported by marine aerosols. Since chlorinated compounds and heavy metals interact with fulvic acids, the presence of fulvic acids in antarctic snow also indicates that such pollutants may also be transported by marine aerosols.

F-52658
Vaughan, D.G., **Tidal flexure at ice shelf margins,** *Journal of geophysical research,* Apr. 10, 1995, 100(B4), p.6213-6224, 33 refs.

Observations on Rutford Ice Stream and Ronne Ice Shelf using the kinematic method of Global Positioning System have yielded the first continuous tidal displacement profiles from an ice sheet hinge zone. The form of these tidal displacement profiles indicates that the flexure can be fitted to an elastic beam model using a parameter space optimization technique. The model matches the observed tidal deflection profile to within 5 cm, which is similar to the observational uncertainty. The same model and parameter fitting technique is then successfully applied to various other published and unpublished tidal displacement data from Doake Ice Rumples, Bach Ice Shelf, and Ekström Ice Shelf, Antarctica, and Jakobshavns Glacier, Greenland. The elastic beam model with a single value of the elastic modulus (0.88±0.35 GPa) adequately describes almost all the data and so can usefully be applied elsewhere. (Auth. mod.)

F-52694
Koshliakov, M.N., Belkin, I.M., Radikevich, V.M., Romanov, IU.A., **Icebergs along 67°S in the Pacific sector of the Antarctic in February-March of 1992,** *Oceanology,* June 1994, 33(6), p.720-726, Translated from Okeanologiia. 16 refs.

The paper contains results of iceberg observations on a transect along 67°S in the Pacific sector of the Antarctic used by R/V *Akademik Ioffe* in Feb.-Mar. of 1992 within the framework of the WOCE international program. The major results show a sharp nonuniformity in the iceberg distribution along the section and a large number of icebergs in the eastern part of the section. The latter could be explained by the coincidence of the positions of the transect and of an intensified jet of the Antarctic Circumpolar Current. At the same time, the results of some simultaneous oceanographic, meteorological and glaciological observations in the western part of the Atlantic sector of Antarctica and in the Antarctic Peninsula area do not exclude the possibility of a general increase in iceberg number in a large part of the Pacific and Atlantic sectors of the southern ocean as a result of the arrival of an anomalous warm period in this part of the Antarctic. (Auth.)

F-52695
Kliausov, A.V., **On the frontal zone near the northern boundary of sea ice distribution in the southern ocean,** *Oceanology,* June 1994, 33(6), p.727-734, Translated from Okeanologiia. 21 refs.

Features of a frontal zone near the northern boundary of sea ice during the period of its maximum spreading were studied, using long-term observations of YugNIRO and Yugrybpoisk for the Indian Ocean sector of the southern ocean. The influence of this zone on the amount of sea ice, hydrological regime, plankton and nekton distributions is discussed. (Auth.)

F-52700
James, T.S., Ivins, E.R., **Present-day antarctic ice mass changes and crustal motion,** *Geophysical research letters,* Apr. 15, 1995, 22(8), p.973-976, 18 refs.

The peak vertical velocities predicted by three realistic, but contrasting, present-day scenarios of antarctic ice sheet mass balance are found to be of the order of several mm/a. One scenario predicts local uplift rates in excess of 5 mm/a. These rates are small compared to the peak antarctic vertical velocities of the ICE-3G glacial rebound model, which are in excess of 20 mm/a. If the Holocene antarctic deglaciation history portrayed in ICE-3G is realistic, and if regional upper mantle viscosity is not an order of magnitude below 10^{21} Pa·s, then a vast geographical region in West Antarctica is uplifting at a rate that could be detected by a future Global Positioning System (GPS) campaign. While present-day scenarios predict small vertical crustal velocities, their overall continent-ocean mass exchange is large enough to account for a substantial portion of the observed secular polar motion and time-varying zonal gravity field. (Auth.)

F-52703
Lane-Serff, G.F., **On meltwater under ice shelves,** *Journal of geophysical research,* Apr. 15, 1995, 100(C4), p.6961-6965, 7

refs.

The basic features of the flow of meltwater under ice shelves can be described by a set of simple relations and length scales. The flow may be divided into two regions, with different basic processes dominating in each. In the first region, melting of the underside of the ice shelf is important and the temperature and salinity of the current tend toward "equilibrium" values, such that the changes due to melting of the ice shelf are balanced by changes due to entrainment of ambient seawater. The equilibrium values change with depth owing to the effect of the change in pressure on the freezing point. As the current increases in thickness, it is no longer able to adjust sufficiently rapidly to the changing equilibrium values, and the flow moves into the second region. The extent of the first region is governed by the location of the "ambient freezing point." In the second region, melting is less important and the current behaves as an entraining drag-limited gravity current in a stratified ambient fluid, leaving the shelf once the current has the same density as the ambient seawater. (Auth. mod.)

F-52704

Jenkins, A., Bombosch, A., **Modeling the effects of frazil ice crystals on the dynamics and thermodynamics of Ice Shelf Water plumes,** *Journal of geophysical research,* Apr. 15, 1995, 100(C4), p.6967-6981, 46 refs.

Seawater that comes into contact with the base of a floating ice shelf is modified as a result of the phase changes that occur. Melting is prevalent in the deepest parts of the subice cavity, and this drives a buoyant flow of Ice Shelf Water (ISW) along the sloping ice shelf base. The ascent of the ISW toward the surface of the ocean causes supercooling, because the freezing point rises with the falling pressure, and this induces a change from melting to freezing. Assuming that seed crystals exist, the ISW now fulfills the condition for the rapid growth of disc-shaped frazil ice crystals, which may subsequently settle (upward) out of suspension under the action of gravity. A simple numerical model of these processes has been developed, based on the theory of inclined plumes. The ISW is treated as a turbulent, particle-laden gravity current ascending a reactive boundary and containing a suspended crystal load which evolves in response to the supercooling of the water and the inverted sedimentation of the crystals. (Auth. mod.)

F-52705

Bombosch, A., Jenkins, A., **Modeling the formation and deposition of frazil ice beneath Filchner-Ronne Ice Shelf,** *Journal of geophysical research,* Apr. 15, 1995, 100(C4), p.6983-6992, 29 refs.

Large areas of the Filchner-Ronne Ice Shelf are underlain by layers of marine ice, which form when supercooled seawater circulating beneath the ice shelf freezes. The freezing process initially produces a suspension of disc-shaped frazil ice crystals, and these are subsequently deposited onto the ice shelf base in areas where the flow of water is slack enough. This has been modeled assuming that the freezing takes place within buoyant plumes of Ice Shelf Water ascending the ice shelf base from source regions near the grounding lines of the major inlet glaciers. The deposition of the majority of the suspended frazil ice is found to occur in spatially discrete bursts, where peak rates of accumulation at the ice shelf base exceed 1 m/yr of solid ice. There is a good correlation between the location of the zones of crystal deposition and the position of the upstream limits of the marine ice layers. (Auth. mod.)

F-52706

Souchez, R., et al, **Investigating processes of marine ice formation in a floating ice tongue by a high-resolution isotopic study,** *Journal of geophysical research,* Apr. 15, 1995, 100(C4), p.7019-7025, 31 refs.

An insight into the problem of determining the conditions necessary for freezing at the ice shelf-ocean interface can be gained by studying the isotopic properties of the marine ice, both in δD and $\delta^{18}O$. With this last perspective in mind a field program was conducted in Terra Nova Bay area within the 1989-90 Italian Antarctic Program in order to study outcropping sites of marine ice which has been accreted at the base of ice shelves or ice tongues. Two such sites have been sampled, one at Hells Gate Ice Shelf in the south of Terra Nova Bay [Souchez et al., 1991] and the other at the Campbell Glacier Tongue in the north. The ice cores collected at these sites were kept frozen at -25°C and studied for their crystallographic and isotopic properties. The isotopic analyses were done with an accuracy of 0.5 per mill for δD and of 0.1 per mill for $\delta^{18}O$ on 2-mL samples. (Auth. mod.)

F-52718

Dore, J.E., Houlihan, T., Karl, D.M., **RACER: Nitrogen remineralization within antarctic sea ice during the 1992 austral winter,** *Antarctic journal of the United States,* 1993, 28(5), p.167-169, 13 refs.

Studies show that the winter pack-ice ecosystem of the western Antarctic Peninsula contains an active heterotrophic component and an active nitrifying component, which serve to regenerate nitrogen within the ice. It appears, however, that diffusion of this recycled nitrogen into the underlying water column is limited. Also, the properties of pack-ice microbial communities in this region appear to be as heterogeneous as the ice itself.

F-52753

Watanabe, O., ed, NIPR Symposium on Polar Meteorology and Glaciology, 16th, Tokyo, Aug. 4-5, 1993, **Proceedings of the NIPR Symposium on Polar Meteorology and Glaciology, No.8,** Tokyo, National Institute of Polar Research, Nov. 1994, 215p., Refs. passim. For selected papers see 49-4500 through 49-4508 or F-52761 through F-52766, I-52754 through I-52760.

This is a collection of papers presented at the 16th Symposium on Polar Meteorology and Glaciology held on Aug. 4-5, 1993, in Tokyo. It consists of 13 full-length papers pertinent to Antarctica and 31 abstracts; the former were refereed and are arranged in the order of scientific areas of meteorology, glaciology, physical oceanography and observational techniques.

F-52761

Xie, S.M., Bao, C.L., Xue, Z.H., Zhang, L., Hao, C.J., **Interaction between antarctic sea ice and ENSO events,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Nov. 1994, p.95-110, 13 refs.

The theory of the cross-coupled correlation-resonance of two wave spectra is used to study the interaction between antarctic sea ice and ENSO events. It is found that the principal period of the correlation time series oscillation is usually coincident with the principal period of sea ice itself; the sea ice of the Ross Sea area, with its principal period of quasi-11 years, has a strong cross correlation oscillation with SSTA of Niño 4. The same is true for the Weddell Sea ice and SSTA of the central-eastern equatorial Pacific but with a common period of quasi-5 years. ENSO events have a good correlation with sea ice in the eastern Antarctic, in their later stage. SST of the central equatorial Pacific has a quasi-contemporary oscillation relationship with Ross Sea ice, and a 1.5 year lag oscillation relationship with Weddell Sea ice. The authors call this oscillation relationship between antarctic sea ice and ENSO events the Southern Oceanic Oscillation (SOO). (Auth. mod.)

F-52762

Xie, S.M., Bao, C.L., Hao, C.J., **Study on the oscillation relationship between sea ice of the Arctic and Antarctic,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Nov. 1994, p.111-128, 16 refs. For another version, see F-51750 or 49-1572.

Antarctic sea ice is divided into four regions: SPI1, the eastern antarctic region; SPI2, centered at the Ross Sea; SPI3, centered at the Weddell Sea; and SPI4, the whole antarctic sea region. Arctic sea ice is divided into three regions: NPI1 on the Pacific side; NPI2 on the Atlantic side; and NPI3, the whole arctic sea region. In this paper, the SIGRID polar sea ice data provided by WDC-A are used to analyze the interrelations between the arctic and antarctic sea ice. It is found that complicated interactions exist, with the most outstanding characteristics as follows: NPI2 plays a leading role in the interactions between the two poles' sea ice. SPI3 is a positive feedback center affecting the antarctic sea ice. SPI2 is a negative feedback center affecting the two poles' sea ice. The strongest interactions among NPI2, SPI3 and SPI2 involve a quasi-periodic intensity variation between sea ice of the Antarctic and Arctic with cycle period of 5-6 years. This cycle period coincides with the principal period of NPI2 and SPI3 variations themselves. (Auth. mod.)

F-52763
Uchida, T., Mae, S., Hondoh, T., Lipenkov, V.IA., Duval, P., Kawabata, J., **Growth process of air-hydrates and diffusion of air molecules in deep ice sheet,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Nov. 1994, p.140-148, 10 refs.

Geometrical parameters of air-hydrate crystals in Vostok ice cores revealed that air-hydrate crystals were growing in the deep ice sheet. Air-hydrate crystals with radius of 65 to 100 μm grew while smaller crystals disappeared. The smaller the crystal was, the quicker its number concentration decreased. A growth model of air-hydrate crystals in ice sheets was developed by assuming a spherical diffusion field of gas molecules and their steady-state diffusions. A model with the given geometrical parameters gave an estimate that the product of the diffusion coefficient and equilibrium concentration of gas molecules in ice is on the order of 10^{-19} m^2/s under the conditions of a deep ice sheet. This estimate is reasonable if the concentration of gas molecules in ice is assumed to be the same as that of self-interstitial of ice. The results indicate that gas molecules could diffuse several tens of centimeters during 100 kyr. (Auth.)

F-52764
Maeno, H., et al, **Using a mobile radio echo sounder to measure bedrock topography in east Queen Maud Land, Antarctica,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Nov. 1994, p.149-160, 5 refs.

As part of the Dome Fuji Project, the topography of the bedrock over a wide area around Dome F and along routes from Dome F to S16 (about 1000 km) was surveyed by radio echo sounder with a continuous recording system. The bedrock topography was successfully measured under ice sheets thicker than 3500 m, and the performance of the radio echo sounder was confirmed. The highest point of Dome F was located in the basin-like topography of the bedrock, surrounded by more elevated areas. The strength of the bedrock echo was found to differ substantially between inside and outside of the Dome F area. It is suggested that this is due to the difference of ice sheet temperatures between these areas, since the attenuation coefficients depend on ice temperature. The stronger echo at high altitude will enable one to measure ice thicknesses of more than 3500 m. (Auth.)

F-52765
Muramoto, K., Matsuura, K., Endoh, T., **Technique of continuous analysis of sea ice distribution using video images taken from a ship,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Nov. 1994, p.161-168, 13 refs.

A technique is described for patching video images of ice covered water. The sea ice was photographed by video camera from the ship *Shirase* between Fremantle and Showa Station. Continuous video images are obtained using geometric transformation and template matching. Both shape of the ice and compactness along the ship's route can be obtained continuously. (Auth.)

F-52766
Takeya, H., Hatanaka, M., Sakaguchi, T., Nishitsuji, A., Hoshiyama, M., Wada, M., **Method to analyze the meteorological radar echo observed at Syowa Station, Antarctica,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Nov. 1994, p.169-177, 12 refs.

The authors propose an approach to evaluate precipitation rates from meteorological radar echoes and snow particle size distribution data. They applied this approach to the analysis of two sets of radar echo data obtained at Showa Station on Apr. 6 and Oct. 1, 1988. The estimated precipitation rates agree with the results obtained from the Z factor-precipitation rate relations, which were measured at Showa Station. On the basis of these results, the authors feel confident that their approach can be applied to the analysis of meteorological radar echoes in Antarctica. (Auth. mod.)

F-52768
Mitrovica, J.X., Pan, R., Forte, A.M., **Late Pleistocene and Holocene ice mass fluctuations and the Earth's precession constant,** *Earth and planetary science letters,* Dec. 1994, 128(3-4), p.489-500, 29 refs.

Using a set of previously published Maxwell viscoelastic Earth models, time-dependent variations in the Earth's precession constant, H, associated with glacial cycles of duration $\approx 10^5$ yr were computed. Peak perturbations were found which are approximately an order of magnitude less than previous upper bound estimates, which assumed that variations in H arose solely from the redistribution of the ice age surface mass (ice plus ocean) load; that is, these studies neglected the viscoelastic isostatic adjustment of the solid planet and assumed a rigid Earth. A number of subsequent studies have cited and/or adopted the 'rigid Earth' variation in H to argue for a series of potentially important effects on the Earth's orbital dynamics, rotation and palaeoclimate. The results presented herein suggest that these arguments require significant re-appraisal. Also computed were variations in H associated with the documented retreat of small ice sheets and glaciers over the last century and potential (recent) mass variations in the antarctic and Greenland ice complexes. In the case of a net mass loss from the antarctic and Greenland ice sheets, these effects may contribute a perturbation to H which is approximately the same amplitude as, but has the opposite sign to, the contribution from ongoing glacial isostatic adjustment during the last century. (Auth. mod.)

F-52789
Alley, R.B., Gow, A.J., Meese, D.A., **Mapping c-axis fabrics to study physical processes in ice,** *Journal of glaciology,* 1995, 41(137), p.197-203, 27 refs.

Mapping the spatial distribution of c-axis orientations in ice thin sections is not much more difficult than preparing c-axis scatter plots but can reveal additional information about processes responsible for the observed fabric and texture of the ice. Distributions of angles between c-axes of neighboring grains from the Byrd Station (West Antarctica) ice core suggest that polygonization causes average grain-size to stabilize below 400 m depth. (Auth.)

F-52790
Lliboutry, L.A., Whillans, I.M., Van der Veen, K., **Why calculated basal drags of ice streams can be fallacious,** *Journal of glaciology,* 1995, 41(137), p.204-205, 3 refs. Includes reply. For paper under discussion see 48-3569 or 22F-50197.

This letter and reply discuss basal drag mechanics within antarctic ice streams, and focuses on imputed inaccuracies in a previous paper.

F-52798
Kawamura, T., Takizawa, T., Ohshima, K.I., Ushio, S., **Data of sea-ice cores obtained in Lützow-Holm Bay from 1990 to 1992 (JARE-31, -32) in the period of Japanese Antarctic Climate Research,** *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1995, No.204, 42p.

As part of the Japanese Antarctic Climate Research (ACR) Program, a two-year study of atmosphere/sea-ice/ocean interaction was conducted off Queen Maud Land and Enderby Land by JARE-31 and JARE-32. Research on the distribution of snow depth and sea-ice thickness and on the growth process of sea ice was done in Lützow-Holm Bay. This report presents data of sea-ice core samples studied.

F-52799
Motoyama, H., Enomoto, H., Miyahara, M., Koike, J., **Glaciological data collected by the 34th Japanese Antarctic Research Expedition in 1993,** *Japanese Antarctic Research Expedition. JARE data reports,* Jan. 1995, No.202, 42p., Refs. passim.

This report presents an outline of field observations carried out by JARE-34 in 1993. Data on net snow accumulation and surface meteorological data, obtained during oversnow traverses from Showa to Dome Fuji Station and at Mizuho Station, are discussed and presented in tables.

F-52800
Fujii, Y., Motoyama, H., Azuma, N., **Glaciological data collected by the 30th, 31st and 32nd Japanese antarctic research expeditions in 1989-1991,** *Japanese Antarctic Research Expedition. JARE data reports,* Jan. 1995, No.201, 89p., Refs. passim.

This report presents an outline of the glaciological field work of 1989-1991 by JARE-30, 31 and 32. Data on net snow accumulation at Mizuho and Asuka Stations, surface meteorologica data obtained during oversnow traverses, and aerophotographic courses along the ice sheet margin near Showa are discussed and presented in tables.

F-52831

Rind, D., Healy, R., Parkinson, C., Martinson, D., **Role of sea ice in 2 X CO_2 climate model sensitivity. Part I. The total influence of sea ice thickness and extent,** *Journal of climate,* Mar. 1995, 8(3), p.449-463, 33 refs.

As a first step in investigating the effects of sea ice changes on the climate sensitivity to doubled atmospheric CO_2, the authors use a standard simple sea ice model while varying the sea ice distributions and thicknesses in the control run. Thinner ice amplifies the atmospheric temperature sensitivity in these experiments by about 15% because it is easier for the thinner ice to be removed as the climate warms. Thus, its impact on sensitivity is similar to that of greater sea ice extent in the control run, which provides more opportunity for sea ice reduction. An experiment with sea ice not allowed to change between the control and doubled CO_2 simulations illustrates that the total effect of sea ice on surface air temperature changes, including cloud cover and water vapor feedbacks that arise in response to sea ice variations, amounts to 37% of the temperature sensitivity to the CO_2 doubling. These results highlight the importance of properly constraining the sea ice response to climate perturbations, necessitating the use of more realistic sea ice and ocean models. (Auth. mod.)

F-52832

Simmonds, I., Jacka, T.H., **Relationships between the interannual variability of antarctic sea ice and the Southern Oscillation,** *Journal of climate,* Mar. 1995, 8(3), p.637-647, 45 refs.

A climatology of antarctic sea ice extent based on 20 years of data (1973-1992) is presented, including measures of interannual variability and extrema. In the first half of the year the greatest variability is found in the Western Hemisphere, particularly in the Weddell and Ross Sea regions, while in the second semester the variability displays a considerable degree of zonal symmetry. This dataset is used to explore the possible links between antarctic sea ice extent and the Southern Oscillation Index (SOI). To do this the authors have calculated their correlation for all pairings of calendar months, as well as with the SOI taken from the year before and subsequent to that of the time of the sea ice data. Most of the correlations assume their largest magnitude when the SOI leads the anomalies in the sea ice, but these differ considerably among the three ocean basins. The possibility is examined of links between the SOI and sea ice in four key sectors around the antarctic coast, namely, the southwest Indian Ocean, the southwest and southeast Pacific Ocean, and a sector to the west of the Ross Sea. In general, the correlations for these domains are stronger that those found over the entire ocean basins, supporting suggestions that there are important key regions over which the antarctic sea ice influences, and is influenced by, the Southern Oscillation. (Auth. mod.)

F-52839

Fitzsimons, S.J., Colhoun, E.A., **Form, structure and stability of the margin of the antarctic ice sheet, Vestfold Hills and Bunger Hills, East Antarctica,** *Antarctic science,* June 1995, 7(2), p.171-179, 33 refs.

Studies of glacier margins have suggested that form and structure can be used to infer mass balance condition and stability. This paper examines this idea by investigating the form and structure of the antarctic ice sheet at two coastal oases in East Antarctica. Two principal forms of the margin of the ice sheet in the Vestfold and Bunger hills that are discussed are ice cliffs and gently-sloping ice margins with an inner moraine. The form of the ice margins in both areas is primarily related to the accumulation of drift snow and superimposed ice and not to mass balance condition. It is concluded that the form and structure of ice margins are ambiguous indicators of mass balance condition and stability and that a change in mass budget is probably neither a sufficient nor a necessary condition for a change in the morphology of ice margins. Although the authors argue that the form and structure of the ice margins tells us little about stability, interpretation of the Holocene history and geomorphology of the oases suggests that the ice margins have been stable at least throughout the Holocene and that this condition of overall stability continues today. (Auth.)

F-52840

Jarvis, E.P., King, E.C., **Seismic investigation of the Larsen Ice Shelf, Antarctica: in search of the Larsen Basin,** *Antarctic science,* June 1995, 7(2), p.181-190, Refs. p.189-190.

Seismic reflection surveys were carried out over the Larsen Ice Shelf to examine the extent of the observed sedimentary sequences of the Larsen Basin as suggested by aeromagnetic and gravity data. The surveys were carried out with a team of six, working from Skidoo motor toboggans and Nansen sledges. Charges of up to 8 kg were fired in hot-water drilled holes up to 9 m deep and 6 sec records made by a 48 channel TI DFS V system with a 4 ms sample interval. The reflection data were supplemented by shallow refraction surveys using a 12-channel Nimbus seismograph and by a 12 km expanding spread experiment. The 24 km of reflection data showed high seismic velocities with weak shallow reflectors, characteristics which are quite different from the known basin fill on James Ross I. It is concluded that the surveys were done outside the basin and that the depth to basement estimates made from the aeromagnetic data do not provide a reliable guide to the extent of the basin. (Auth. mod.)

F-52842

Ward, C.G., **Mapping ice front changes of Müller Ice Shelf, Antarctic Peninsula,** *Antarctic science,* June 1995, 7(2), p.197-198, 6 refs.

Müller Ice Shelf is a small ice shelf (≈80 km^2) fed by Brückner and Antevs glaciers, which both flow northward off the central peaks of Arrowsmith Peninsula; the ice shelf contains Humphreys Ice Rise. Data sources have indicated that not only has the ice front retreated since 1947 but also that there have been two advances. This paper describes how these changes were recorded using simple photogrammetric techniques.

F-52866

Surdyk, S., Fily, M., **Results of a stratified snow emissivity model based on the wave approach: application to the antarctic ice sheet,** *Journal of geophysical research,* May 15, 1995, 100(C5), p.8837-8848, 34 refs.

The results from a snow emissivity model are used to help with the interpretation of the Scanning Multichannel Microwave Radiometer data (aboard the satellite Nimbus 7, 1978-1986) over Antarctica. The snow is considered isothermal with horizontal stratification, isotropic inside each stratum, and with smooth interfaces. The spatial distribution of the microwave signatures over Antarctica reveals three areas with typical spectral signatures. These areas are identified from the point of view of snow characteristics through a ground data set (Surdyk and Fily, 1993). The model reproduces well the effect of the stratification on the polarization differences as observed. The strong gradient of emissivity versus frequency observed on one of the test sites is not completely understood. Depth hoar layers characterized by faceted and cup-shaped coarse snow grains seem to have a particular scattering behavior compared with that of the usual grains. When these coarse grains are replaced by fine grains, the model results are closer to the measured data. (Auth. mod.)

F-52868

Dunphy, P.P., Dibb, J.E., Chupp, E.L., **Gamma-ray detector for in-situ measurement of ^{137}Cs radioactivity in snowfields and glaciers,** *Nuclear instruments and methods in physics research A,* Dec. 30, 1994, 353(1-3), Symposium on Radiation Measurements and Applications, 8th, Ann Arbor, MI, May 16-19, 1994. Proceedings, p.482-485, 15 refs.

Radioactive debris from above-ground tests of nuclear weapons (mainly 1954-1970) and from the Chernobyl accident (1986) have been deposited on glaciers and snowfields, where they can be used as time and depth markers to determine the subsequent accumulation of snow. A technique is presented to locate these markers that has been used just recently: in-situ measurement of γ-rays from ^{137}Cs. These γ-rays, which are associated with radioactive fallout, have a distinctive depth profile and serve as markers of historical nuclear events. The γ-ray measurement involves lowering a scintillation detector down a borehole in the snow or ice and recording the response to the ^{137}Cs γ-rays as a function of depth. The in-situ measurement can be done relatively quickly and can replace sample retrieval, or it can be used to decide which ice or snow samples should be transported for later analysis in the laboratory. Reported here is a portable detector system that is being developed for use in Antarctica. It is based on inexpensive, commercially available detectors and electronics. (Auth. mod.)

F-52870

Fischer, H., **Comparison of an optimized dynamic-thermodynamic sea ice model with observations in the Weddell Sea** [Vergleichende Untersuchungen eines optimierten dynamisch-thermodynamischen Meereismodells mit Beobachtungen im Weddellmeer], *Berichte zur Polarforschung,* 1995, No.166, 130p., In German with English summary. The work is based on the author's dissertation submitted to the University of Bremen in 1994. Refs. p.125-130.

The role of the sea ice in determining the boundary conditions at the sea surface and its influence on the global ocean circulation is presently investigated with several sea ice-ocean models. This investigation is carried out through a comparison between observations and sea ice model results. An optimized dynamic-thermodynamic sea ice model for the Weddell Sea is coupled to a one-dimensional mixed layer model and is forced with atmospheric boundary conditions from global analyses for the years 1986 and 1987. From sensitivity studies the influence of different atmospheric forcings and model parameters is examined to quantify the required accuracy for a realistic simulation of sea ice. Air temperature and wind field have to be known to a high accuracy to produce a good correspondence between model results and sea ice observations. The net freezing rate, which represents the most important boundary condition for the polar ocean, is essentially determined by the strength and structure of the wind field. The optimized sea ice model shows a good agreement with sea ice concentrations which were analyzed using data taken from passive microwave sensors. (Auth. mod.)

F-52888

International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993, **Proceedings,** *Annals of glaciology,* 1994, Vol.20, 458p., Refs. passim. For individual papers see 49-4909 through 49-4977 or F-52889 through F-52957.

This volume consists of 69 papers presented during the Fifth International Symposium on Antarctic Glaciology, held in Cambridge, U.K., on Sep. 5-11, 1993. The studies cover numerous features of ice and snow, including their interaction with each other, the atmosphere and the ocean. Paleoclimatological implications derived from the study of ice cores are also considered.

F-52889

Winther, J.G., **Spectral bi-directional reflectance of snow and glacier ice measured in Dronning Maud Land, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.1-5, 14 refs.

Visible and near-infrared spectral reflectances of snow and superimposed ice were measured in Queen Maud Land during the 1992-93 austral summer. Spectral-reflectance curves of both snow and superimposed ice remain high (>80%) in the visible region. A pronounced decrease in reflectance appears in the near-infrared, especially for superimposed ice. Superimposed ice with a 1 cm thick surface layer of ice-bound snow crystals had a considerably higher reflectance than superimposed ice containing only a few snow crystals. Furthermore, these data prove that snow and superimposed ice reflect solar radiation specularly and suggest that the anisotropy strengthens with increasing wavelengths. Integrated in-situ reflectances corresponding to Landsat TM bands 1-4 show that TM band 1 is least affected, whereas TM band 4 is most affected by anisotropy. (Auth. mod.)

F-52890

Skvarca, P., **Changes and surface features of the Larsen Ice Shelf, Antarctica, derived from Landsat and Kosmos mosaics,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.6-12, 11 refs.

Two uncontrolled mosaics were assembled at a 1:1,000,000 scale, covering for the first time almost the entire Larsen Ice Shelf area, using Landsat TM images of 1986-89 and the Kosmos KATE-200 photographic products of late 1975. By comparing them, it was possible to estimate the change along the 600 km north-south ice-shelf's seaward margin where substantial calving has occurred recently. In overall extent, the ice shelf has decreased by 9300 km^2 since 1975. The interpretation of the available satellite data also allowed estimates of the ice-shelf's inland boundary and detection of new surface ice features. Estimates of surface velocities were derived by photographically co-registering sequential imagery in the chaotic rifted-crevassed area east of Kenyon Peninsula, where conspicuous ice features could be clearly detected even after a 10 year interval. The Landsat TM mosaic, though uncontrolled, provides a basic data set for future studies of global change of the major ice shelf on the Antarctic Peninsula. (Auth. mod.)

F-52891

Jacka, T.H., Li, J., **Steady-state crystal size of deforming ice,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.13-18, 30 refs.

Previous studies have established that, together with the development of a preferred crystal-orientation fabric in ice undergoing creep deformation to high strains, there also develops a tertiary equilibrium crystal size, i.e. the crystal size, rather than affecting the creep rate, is a result of the deformation to large strains. Equilibrium crystal size is considered here as a "balance" between crystal growth with time as a function of temperature and crystal change as a result of temperature-dependent deformation. The temperature effects in these two processes (Arrhenius relation) are similar. Consideration of the activation energies for the two processes indicates that it may be appropriate to cancel them, yielding a dependence of equilibrium crystal size on stress alone. (Auth. mod.)

F-52892

Sherjal, I., Fily, M., **Temporal variations of microwave brightness temperatures over Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.19-25, 14 refs.

Passive microwave brightness temperatures from the Special Sensor Microwave Imager (SSMI) are studied together with surface air temperatures from two Automatic Weather Stations (AWS) for the year 1989. One station is located on the East Antarctic plateau (Dome C) and the other on the Ross Ice Shelf. The satellite data for frequencies 19, 22 and 37 GHz with vertical polarization, centered on the two AWS stations, are studied. A simple thermodynamic model, and a simple radiative-transfer model that takes into account the snow temperature profile and assumes a constant annual emissivity, are proposed. The combination of these two models enables one to compute extinction coefficients, penetration depths and to retrieve the measured brightness temperature variations from the AWS surface temperatures. Afterwards, this model is reversed in order to retrieve the snow-surface temperatures from the satellite data. Results are promising but strong approximations and *a priori* knowledge of the extinction coefficient are still needed at this point. (Auth.)

F-52893

Lingle, C.S., Lee, L.H., Zwally, H.J., Seiss, T.C., **Recent elevation increase on Lambert Glacier, Antarctica, from orbit cross-over analysis of satellite-radar altimetry,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.26-32, 24 refs.

The mean rate-of-change of the surface elevation on lower Lambert Glacier was measured with satellite-radar altimetry from the Geosat Exact Repeat Mission (ERM) (1987-89) and Seasat (1978), using orbit cross-over analysis. The orbit bias between the two satellites is estimated from cross-over differences over sea ice seaward of the calving front of the Amery Ice Shelf. The results show a mean rate of increase of the surface height on lower Lambert Glacier of 31±10 mm/yr over the decade from 1978 to 1987-89. The computation is also carried out independently using data not low-pass filtered but with orbit bias minimized by adjusting the Seasat and Geosat ERM orbits into a common ocean surface. The latter analysis shows a mean rate of increase of the surface height of 83±9 mm/year during the same time period. Cross-over analyses carried out using altimetry not low-pass filtered and with orbits not adjusted into a common ocean surface yield intermediate results. Taken together, the cross-over analyses show that the surface height on lower Lambert Glacier increased at a mean rate within the range 20-90 mm/year during the decade 1978 to 1987-89. (Auth. mod.)

F-52894

Jeffries, M.O., Veazey, A.L., Morris, K., Krouse, H.R., **Depositional environment of the snow cover on West Antarctic pack-ice floes,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.33-38, 17 refs.

The depth, density, load and isotopic ($\delta^{18}O$) composition of the snow cover on pack-ice floes were measured in late austral summer 1992 in the eastern Ross, Amundsen and western Bellingshausen Seas. Snow-density values commonly exceeded 350 kg/m^3 and some were as high as 500 kg/m^3. The densification of the snow occurs quickly and is attributed to a windy environment. The high density and sometimes considerable depth of the snow on the floes accounts for loads of as much as 700 kg/m^2 and resultant sea-water flooding of the underlying sea ice. Lower mean $\delta^{18}O$ values in the Ross/Amundsen Seas snow cover suggest that the region might have a cooler climate than the Bellingshausen Sea region. (Auth. mod.)

F-52895

Jacobel, R.W., Robinson, A.E., Bindschadler, R.A., **Studies of the grounding-line location on Ice Streams D and E, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.39-42, 8 refs.

Landsat Thematic Mapper (TM) images were used prior to the 1991-92 field season to infer the position of the grounding line at the mouths of Ice Streams D and E, West Antarctica. The field plan for mass-balance studies was based on this determination, and thus the imagery played a central role in both the scientific and logistics planning. A radar profile along the flow direction was made across the inferred grounding line at one location, and ice-thickness measurements together with surface surveying enabled the authors to compare the hydrostatic surface and the actual topography to determine the point at which the ice becomes grounded. The profile transits from floating to grounded ice at the same location as the grounding line inferred from the imagery. Changes in the radar-echo strength also occur at this location, giving further support to this interpretation. (Auth. mod.)

F-52896

Herzfeld, U.C., Lingle, C.S., Lee, L.H., **Recent advance of the grounding line of Lambert Glacier, Antarctica, deduced from satellite-radar altimetry,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.43-47, 18 refs.

Satellite radar-altimeter data from Seasat (1978) and the Geosat Exact Repeat Mission (1987-89) are evaluated to investigate the question of advance or retreat of Lambert Glacier. New maps based on a fine-scale 3 km grid are calculated using ordinary kriging. The break in slope at the 100 m elevation contour, relative to the WGS 1984 ellipsoid, is taken as a proxy for the grounding line. Measurements indicate that the irregular grounding line, which includes shoals, advanced approximately 10 km between 1978 and 1987-89, corresponding to a mean advance rate of about 1 km/year. (Auth.)

F-52897

Bamber, J.L., **Digital elevation model of the antarctic ice sheet derived from ERS-1 altimeter data and comparison with terrestrial measurements,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.48-54, 22 refs.

The launch of ERS-1 provides coverage by satellite altimetry of 80% of the antarctic ice sheet, allowing topographic mapping of areas which previously had a dearth of accurate elevation data. Four 35 d repeat cycles of fast-delivery altimeter data were used in this study, comprising a total of approximately 1,000,000 height estimates. The OSU-91A geopotential model was used to convert ellipsoidal elevations to geoidal values. Corrections for surface slope were applied and a Digital Elevation Model (DEM) was produced with a grid spacing of 20 km. The DEM was compared with a digitized version of the Scott Polar Research Institute Antarctic folio map. This map was derived from orthometric measurements of surface elevation, primarily from pressure altimetry. Differences in excess of 300 m were observed between the two data sets. Only 37% of the region covered showed agreement to better than 50 m, and a significant proportion of this was composed of the Ross and Filchner-Ronne Ice Shelves. The largest discrepancies occurred in marginal areas where there is poor coverage by both satellite altimetry and terrestrial data. (Auth. mod.)

F-52898

Verbers, A.L.L.M., Damm, V., **Morphology and late Cenozoic (<5 Ma) glacial history of the area between David and Mawson glaciers, Victoria Land, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.55-60, 21 refs.

Glacio-geological field work and radar ice-thickness sounding were carried out in the area between David and Mawson Glaciers. A subglacial topographic map has been compiled from radio-echo-sounding data. The northern part of this map shows that the trench of David Glacier reaches a depth of more than 100 m below sea level. The area south of David Glacier comprises a landscape of nunatak clusters dissected by glaciated valleys with ice thicknesses as much as 800 m. Subglacial cirques occur at the outer margins of the nunatak clusters. A model for the regional glacial history is proposed. It starts with a major deglaciation in the Pliocene, which results in marine transgression in basins west of the Transantarctic Mountains. During the late Pliocene, the ice advanced towards the northeast, depositing a thin layer of (Sirius Group) till containing reworked mid-Pliocene marine diatoms. Due to accelerated mountain uplift, the ice cut into the pre-Pliocene peneplain, eroding broad valleys. A period of ice-sheet retreat followed to expose a landscape of large nunataks separated by wide valleys. During this period, local cirque glaciation occurred. When the ice sheet advanced again, another phase of uplift forced the glaciers to cut deeper into the valleys. (Auth.)

F-52899

Veazey, A.L., Jeffries, M.O., Morris, K., **Small-scale variability of physical properties and structural characteristics of antarctic fast ice,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.61-66, 27 refs.

The small-scale variability of physical properties and structural characteristics of multiple pairs of fast-ice cores, obtained during the austral summer of 1991-92 in McMurdo Sound (MCM) and Pine Island Bay (PIB), are examined and discussed with respect to the growth and decay of the sea ice. The ice at the MCM site was thicker than that at the PIB site and was covered by a somewhat thinner snowpack. While mean salinity and temperature of the ice at the two sites were similar, small-scale variations in both salinity and temperature were greater at PIB than at MCM. The ice sheet at MCM was a two-layer medium consisting of congelation ice overlying platelet ice. The ice from the PIB site was composed of mainly frazil ice and layers of congelation ice with occasional thin layers of snow-ice at the surface of the cores. Crystal sub-structure measurements, *c*-axis orientation and brine-layer spacing from the MCM cores revealed that the congelation ice had moderately aligned, horizontally oriented *c* axes. (Auth. mod.)

F-52900

Lestringant, R., **Two-dimensional finite-element study of flow in the transition zone between an ice sheet and an ice shelf,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.67-72, 16 refs.

A numerical study has been carried out on the flow of ice in the transition zone between an ice sheet and an ice shelf. The study was motivated by the need for global ice-sheet-ice-shelf modelling to determine the characteristics of the transition zone. The problem is dealt with from an academic viewpoint, and the study especially focuses on two-dimensional vertical sharp transition zones. Stokes equations are solved using a finite-element method. Conclusions include: in ice-sheet-ice shelf modelling, each of the two components can be computed separately, then linked by a jump-boundary condition for the horizontal velocity; and, as shown by studies in Antarctica on the response of an ice shelf to tidal forcing, the surface elevation/thickness ratio passes through the hydrostatic equilibrium value. (Auth.)

F-52901

Higashi, A., Fujii, Y., **Studies on microparticles contained in medium-depth ice cores retrieved from east Dronning Maud Land, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.73-79, 16 refs.

SEM observations of microparticles in ice-core samples, retrieved in east Queen Maud Land, have been carried out since 1987. Morphology and elemental composition by EDS of many microparticles taken from various depths of the 700 m Mizuho ice core were compared with each other and with those of stratospheric microparticles in NASA Cosmic Dust Catalogs and microparticles hitherto found in deep ice cores retrieved in Antarctica. Number concentrations of microparticles were measured on all samples throughout the Mizuho core. Marked fluctuations found in the depth profile of the concentration seem to coincide with cold climates indicated by $\delta^{18}O$ of the same core. Compositional analysis of volcanic ash at a depth of 500 m in the Mizuho core, dated at approximately 6000 years bp, indicates that the ash originated from the South Sandwich Is. (Auth.)

F-52902

Fujita, S., Mae, S., **Causes and nature of ice-sheet radio-echo internal reflections estimated from the dielectric properties of ice,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.80-86, 28 refs.

The causes and nature of ice-sheet radio-echo internal reflections at deep layers in polar ice sheets are discussed, based on the dielectric properties of ice that have been measured at microwave and radio frequencies at Mizuho Station. The reflection coefficients of electromagnetic waves in ice sheets were derived as a function of the frequency used in radar sounding and the temperature of ice, and both were compared quantitatively. It is shown that at single-plane boundaries the reflection coefficients due to the former cause are independent of frequency and temperature and that they are large enough to produce dominant internal reflections. In contrast, reflection coefficients due to the latter cause strongly depend on frequency and temperature. Since they are inversely proportional to frequency, the latter cause can be dominant only when frequencies below about 60 MHz are used. (Auth. mod.)

F-52903

Kameda, T., Shoji, H., Kawada, K., Watanabe, O., Clausen, H.B., **Empirical relation between overburden pressure and firn density,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.87-94, 25 refs.

Two empirical equations for firn densification have been obtained, considering firn porosity as a function of overburden pressure. In the first equation, the reduction ratio of porosity in firn is assumed to be proportional to the increasing ratio of overburden pressure and the m-th power of the porosity. The porosity exponent m should be close to -2, so as to have a best fit with 14 depth-density profiles from Greenland and Antarctica. In the second equation, the reduction ratio of porosity was assumed to increase proportionally to the increment of overburden pressure and the n-th power of the porosity. The most satisfactory values of n range from -1 to 1. It has been suggested that firn densities, determined primarily by overburden pressure and firn temperature, contribute to a lesser degree. (Auth.)

F-52904

Kameda, T., Naruse, R., **Characteristics of bubble volumes in firn-ice transition layers of ice cores from polar ice sheets,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.95-100, 16 refs.

The air-bubble formation process has been studied experimentally by using five ice cores from Greenland and antarctic ice sheets. Bubble volumes in firn-ice samples were measured by a classical method based on Boyle-Mariotte's law for an ideal gas. It was found that the bubble volume varies with depth as a function of bulk density in the firn-ice transition layer, which is represented by an exponential function of firn density. Air bubbles start to form rapidly at a bulk density of 0.763-0.797 Mg/m^3. This density (p_{ib}) seems to be correlated with the ice temperature in the ice sheets; p_{ib} increases with a decrease in the ice temperature. V_b shows the maximum value in the density range 0.819-0.832 Mg/m^3. The corresponding porosity of the density ranges between 0.110 and 0.097. This porosity does not seem to correlate with ice temperature or accumulation rate at the coring site. These characteristics of firn densities probably affect the amount of entrapped air in glacier ice (total air content) in polar ice sheets. (Auth.)

F-52905

Lucchitta, B.K., Mullins, K.F., Smith, C.E., Ferrigno, J.G., **Velocities of the Smith Glacier ice tongue and Dotson Ice Shelf, Walgreen Coast, Marie Byrd Land, West Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.101-109, 14 refs.

Velocity measurements were made for 2 time intervals on the Smith Glacier ice tongue (1973-88 and 1988-90) and 3 on the Dotson Ice Shelf (1972-88, 1973-88 and 1988-90). The Smith Glacier ice tongue velocities for the two intervals are similar near the grounding line, but show a progressive increase toward the terminus in the late 1980s. The Dotson Ice Shelf velocities of the Smith Glacier ice tongue may be attributed to a general loss of densely packed icebergs that buttressed the terminus during the 1970s but drifted out to sea during the late 1980s. The Smith Glacier ice tongue receded as much as 10 km between 1973 and 1988, and Dotson Ice Shelf 5-7 km in the same time period. Similar observations of drifting and calving were made for the adjacent Thwaites Glacier ice tongue. The cause of the loss of ice in the region is unknown, but it may have been a change in winds or a warming of the air or water during the late 1980s. (Auth.)

F-52906

Nixdorf, U., Oerter, H., Miller, H., **First access to the ocean beneath Ekströmisen, Antarctica, by means of hot-water drilling,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.110-114, 17 refs.

A hot-water drill developed during the past 2 years at Alfred Wegener Institute was used to penetrate the Ekström Ice Shelf several times near the Georg von Neumayer Station. The drilling operation was successful, and the initial large diameter (≥35 cm) allowed easy access to the ocean. One hole was used to install an ultrasonic echo-sounder which recorded the ablation at the ice-shelf bottom continuously. Another hole was used for emplacement of a thermistor string throughout the 237 m thick ice shelf for ice-temperature measurements. Several CTD profiles in the 175 m deep water column, and the analysis of water samples, provided valuable data for the understanding of ice-shelf-ocean interactions. (Auth.)

F-52907

Hammer, C.U., Clausen, H.B., Langway, C.C., Jr., **Electrical conductivity method (ECM) stratigraphic dating of the Byrd Station ice core, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.115-120, 36 refs.

A continuous ECM profile (strong acid concentration) has been measured along the 2191 m of ice core recovered at Byrd Station in 1968. The ECM profile reveals continuous and systematic seasonal changes which are used for dating the ice core back to 50,000 bp. (Auth.)

F-52908

Graf, W., et al, **Snow-accumulation rates and isotopic content (^2H, ^3H) of near-surface firn from the Filchner-Ronne Ice**

Shelf, Antarctica, *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.121-128, 26 refs.

The accumulation and distribution of the ^{2}H content of near-surface layers in the eastern part of the Ronne Ice Shelf were determined from 16 firn cores drilled to about 10 m depth in 1990 and 1992. The cores were dated stratigraphically by seasonal δ^2H variations in the firn. In addition, ^{3}H and high-resolution chemical profiles were used to assist in dating. Both the accumulation rate and the stable-isotope content decrease with increasing distance from the ice edge. The δ^2H profiles of the two ice cores B13 and B15 drilled in 1990 and 1992 to 215 and 320 m depth, respectively, reflect the gradual depletion in ^{2}H in the firn upstream of the drill sites. Comparison with surface data indicates that the ice above 142 m in core B15 and above 137 m in core B13 was deposited on the ice shelf, whereas the deeper ice, down to 152.8 m depth, most probably originated from the margin of the antarctic ice sheet. (Auth. mod.)

F-52909

Shabtaie, S., Bentley, C.R., **Electrical resistivity measurements on Ice Stream B, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.129-136, 46 refs.

Electrical resistivity sounding using the four-electrode Schlumberger array was carried out at station UpB on Ice Stream B at an electrode spacing of 3 km. Measured apparent resistivities were compared with theoretical models based on known relations between resistivity, density and temperature. Densities were measured in a pit and two coreholes; temperatures were measured in the upper 200 m of the ice stream and have been calculated for greater depth from an ice-stream temperature model. The resistivity increases with depth down to 650-700 m. Below that there is a marked decrease over the next 100 m or so that is correlated with the Holocene-Wisconsin transition zone. Still deeper there is an orders-of-magnitude increase to a value in the basal ice of 30 Mohm or more. This extremely high resistivity is similar to that reported for temperature glaciers and deep in the antarctic ice sheet elsewhere. The authors attribute it to the destruction, by extensive metamorphism, of impurity-conduction paths at two-grain boundaries. (Auth.)

F-52910

Yi, D., Bentley, C.R., **Analysis of satellite radar-altimeter return wave forms over the East Antarctic ice sheet,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.137-142, 18 refs.

The precision of satellite-radar altimetry over the antarctic ice sheet can be improved by using a physically based retracking algorithm on the altimeter returns ("wave forms"). Here the authors develop a model that is based on a variable combination of surface- and volume scattering and determine the model parameters through least-square fitting to the observed waveforms. The model parameters include surface roughness, proportion of volume scattering, extinction coefficient and an amplitude coefficient. Geosat data collected over a test sector of the East Antarctic ice sheet have been analyzed to find quantitative estimates of seasonal and geographic variations of the several parameters. Results show that the effect of volume scattering can change the elevation measurement over the inland part of the East Antarctic ice sheet by more than 1 m, and that there are both spatial and temporal variations; temporal variations are less significant than spatial variations. (Auth.)

F-52911

Uchida, T., Hondoh, T., Mae, S., Duval, P., Lipenkov, V.IA., **Effects of temperature and pressure on the transformation rate from air bubbles to air-hydrate crystals in ice sheets,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.143-147, 16 refs.

Experimental investigations on the formation and growth processes of air-hydrate crystals were carried out on the Vostok core to determine the transformation process of air bubbles into air-hydrate crystals in deep ice sheets. The microscopic observations revealed that the transformation began at the boundary between a bubble and ice. Faster transformation occurred along the boundary and, subsequently, the transformation progressed towards the center of the bubble at a lower rate. Each transformation rate increased with pressure and also with temperature. The activation energy of the transformation was about 0.52 eV for the primary transformation process and about 0.90 eV for subsequent processes. These results indicate that the rate determining the process of transformation is mainly supplementation of water molecules to the transformation site. (Auth. mod.)

F-52912

Novick, A.N., Bentley, C.R., Lord, N.E., **Ice thickness, bed topography and basal-reflection strengths from radar sounding, Upstream B, West Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.148-152, 14 refs.

Radar profiling in the area around Upstream B camp was performed during the austral 1991-92 summer. About 150 km of lines covering 80 km^2 along the Ohio State University strain grid were profiled. The high density of data along the profiling lines allowed the use of median filtering schemes to remove or decrease interference from near-surface diffractors. Bed and surface elevations are poorly correlated. Hydraulic-head gradients suggest ponding of water in some places and drainage from others. Reflection amplitudes vary over a range of about 24 db, partly because of scattering by crevasses and partly because of real differences in bed reflection. (Auth.)

F-52913

Clarke, T.S., Bentley, C.R., **High-resolution radar on Ice Stream B2, Antarctica: measurements of electromagnetic wave speed in firn and strain history from buried crevasses,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.153-159, 16 refs.

Two types of experiments were performed near Upstream B Camp using a high-resolution ground-penetrating radar system. In the first type, tracking a metal drill tip through the upper 85 m of the ice column indicated an approximately linear decrease of wave speed with depth down to 50 m, with a constant speed of 170±4 m/µs below. The authors believe the (unexpected) linearity may have been caused by one or more buried crevasses. In the second experiment, a survey of a 250 km^2 grid showed a population of buried crevasses at about 30 m depth that have an estimated burial age of 210±25 years, which is taken to indicate that this ice has been exhibiting streaming behavior for at least that length of time. One 3 km segment along the edge of the survey area nearest the center of the stream showed a virtually flat undisrupted stratigraphy down to the maximum depth of the measurements. The fact that this ice was accelerated from near-zero speed to its present 440 m/a without cracking or folding suggests that it may have been incorporated into the ice stream as a solid block. (Auth.)

F-52914

Bintanja, R., Van den Broeke, M.R., **Local climate, circulation and surface-energy balance of an antarctic blue-ice area,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.160-168, 17 refs.

Results of measurements performed on and around an antarctic blue-ice field are presented. The measurements were carried out in a valley of Heimefront Range during a 2 month field season in the summer of 1992-93. A simple model is used to evaluate the surface-energy balance from measured meteorological quantities. The large differences in the surface-energy balance values between snow and blue ice are mainly caused by differences in albedo, surface roughness, thermal conductivity and shortwave radiation extinction coefficient. Taking into account uncertainties in the calculations, it appears that the calculated sublimation rates over ice and snow do not differ much. (Auth. mod.)

F-52915

Liu, C., Bentley, C.R., Lord, N.E., ***C* axes from radar depolarization experiments at Upstream B Camp, Antarctica, in**

1991-1992, *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.169-176, 17 refs.

Thirty-nine 50 MHz radar polarization experiments were performed in 1991-92 near Upstream B Camp along two lines perpendicular to flow, 1.4 and 2 km long and 900 m apart. For each of the experiments, which were at 100 m intervals, the receiving antenna was held fixed, alternately parallel and perpendicular to flow, while the transmitting antenna was rotated in 15° increments through a full circle twice, once for each orientation of the receiving antenna. The data consist of echo-amplitude measurements from the bottom of the ice. Assuming a model of the ice sheet as a crystalline medium with axial symmetry, the azimuths of the symmetry axis and the cosines of the phase shifts between extraordinary and ordinary waves can be estimated from the variations in amplitude with orientation of the transmitting antenna. The results from bottom echoes show an abrupt change in the axis of symmetry over a distance of only 100 m. This suggests that the experimental lines cross the boundary between two blocks of ice with different stress histories. (Auth.)

F-52916

Atre, S.R., Bentley, C.R., **Indication of a dilatant bed near Downstream B Camp, Ice Stream B, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.177-182, 7 refs.

Phases of seismic P-wave reflections from the bed of Ice Stream B at a site on its ice plain have been examined. The survey comprised a 36 km line at a shallow angle (18°) to ice movement and four 3.6 km cross lines. Reversed-phase and unreversed-phase reflections each characterize about half the bed. The corresponding zones can be correlated in stripes quasi-parallel to ice movement. The authors take this as support for a model previously developed that relates the zones to different types of subglacial sediment dragged along by the ice. There is also evidence for patches of pooled water. (Auth.)

F-52917

Anandakrishnan, S., Alley, R.B., **Ice Stream C, Antarctica, sticky spots detected by microearthquake monitoring,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.183-186, 23 refs.

Microearthquakes at the base of slow-moving Ice Stream C occur many times more frequently than at the base of fast-moving Ice Stream B. It is suggested that the microearthquake source sites are so-called "sticky spots", defined as limited zones of stronger subglacial material interspersed within a weaker matrix. The fault-plane area of the microearthquakes is therefore a measure of the size of the sticky spots. The spatial density of the microearthquakes is a measure of the distribution of sticky spots. The average stress drop associated with these microearthquakes is consistent with an ice-stream bed model of weak subglacial till interspersed with stronger zones that support much or all of the basal shear stress. The authors infer a weak inter-sticky-spot material by the large distances, relative to fault radius, to which the microearthquake stress change is transmitted. (Auth.)

F-52918

Alley, R.B., Anandakrishnan, S., Bentley, C.R., Lord, N.E., **Water-piracy hypothesis for the stagnation of Ice Stream C, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.187-194, 53 refs.

Water piracy by Ice Stream B may have caused neighboring Ice Stream C to stop. The modern hydrologic potentials near the upstream end of the main trunk of Ice Stream C are directing water from the C catchment into Ice Stream B. Interruption of water supply from the catchment would have reduced water lubrication on bedrock regions projecting through lubricating basal till and stopped the ice stream in a few years or decades, short enough to appear almost instantaneous. This hypothesis explains several new data sets from Ice Stream C and makes predictions that might be testable. (Auth.)

F-52919

Allison, I., Worby, A., **Seasonal changes of sea-ice characteristics off East Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.195-201, 9 refs.

Data on antarctic sea-ice characteristics and their spatial and temporal variability are presented from cruises between 1986 and 1993 for the region spanning 60-150°E between Oct. and May. In spring, the sea-ice zone is a variable mixture of different thicknesses of ice plus open water and in some regions only 30-40% of the area is covered with ice >0.3 m thick. The thin-ice and open-water areas are important for air-sea heat exchange. Crystallographic analyses of ice cores, supported by salinity and stable-isotope measurements, show that approximately 50% of the ice mass is composed of small frazil crystals. These are formed by rapid ice growth in leads and polynyas and indicate the presence of open water throughout the growth season. Ice growth by congelation freezing rarely exceeds 0.4 m, with increases in ice thickness beyond this mostly attributable to rafting and ridging. While most of the total area is thin ice or open water, in the central pack much of the total ice mass is contained in ridges. (Auth. mod.)

F-52920

Goodwin, I.D., Higham, M., Allison, I., Ren, J.W., **Accumulation variation in eastern Kemp Land, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.202-206, 14 refs.

The spatial pattern of accumulation rate for eastern Kemp Coast in the elevation range 1850-2700 m is presented together with observations of the physical parameters of snow temperature, average microwave emissivity (19 GHz, H polarization), distribution of depth hoar and firn-crystal diameter. The broad accumulation pattern in the region was found to be significantly low when compared to other coastal areas of East Antarctica such as Wilkes Land. The low accumulation regime is attributed to low atmospheric moisture transport and low penetration of synoptic cyclonic systems onto the coastal slopes. In the absence of high coastal precipitation, the accumulation rate is determined predominantly by surface snow-redistribution processes. Attempts to determine accumulation-rate time series using visible layer, $\delta^{18}O$ isotope and electrical conductivity stratigraphies were unsuccessful due to the relatively low coastal accumulation rates (less than 280 kg/m^2/a) and the complex modification of precipitation by redistribution processes. (Auth. mod.)

F-52921

Salamatin, A.N., Lipenkov, V.IA., Blinov, K.V., **Vostok (Antarctica) climate record time-scale deduced from the analysis of a borehole-temperature profile,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.207-214, 24 refs.

Several sets of temperature measurements were carried out from 1972-88 in the Vostok borehole. They have provided an ice-sheet temperature profile down to a depth of 2000 m. The accuracy of the profile is sufficient to analyze perturbations induced by the surface-temperature variations over the last climatic cycle. The mathematical model developed for the ice-temperature computation is applied to solve an inverse problem. The amplitudes and phase lags of the main harmonic components in the surface-temperature variations are reconstructed on the basis of fitting the calculated ice-temperature profile to the experimental one with the assumption that Milankovich cycles (100, 41, 23 and 19 ky) are dominant in the climate oscillations. Minimal standard deviation between calculated and measured temperature profiles is found of the same order as the reproducibility of the temperature measurements (0.005-0.01°C). Although the simulated temperature-time curve obtained in this study does not contain short-term variations, all the main climate events predicted from the ice-core isotope analysis can be recognized. (Auth. mod.)

F-52922

Morse, D.L., Waddington, E.D., **Recent survey of brine infiltration in McMurdo Ice Shelf, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.215-

218, 13 refs.

The brine infiltration zone of McMurdo Ice Shelf has been extensively studied by other authors. Brine percolates inland laterally from the ice front, opposite to the direction of ice-shelf motion. Inland propagation of brine pulses following ice-shelf break-outs appears to be the primary brine-infiltration mechanism. During the 1992-93 field season, the authors used radio-echo sounding to resurvey the inland limit of the brine-infiltration zone. The boundary had been similarly mapped in 1977. They observed that since the earlier survey, one 7 km section has retreated seaward by approximately 800 m while another 5 km section is unchanged. These displacements are consistent with the earlier hypothesis that brine infiltration occurs by the influx of brine pulses. (Auth.)

F-52923

Waddington, E.D., Morse, D.L., **Spatial variations of local climate at Taylor Dome, Antarctica: implications for paleoclimate from ice cores,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.219-225, 33 refs.

Ten m firn temperatures measured at Taylor Dome are influenced by a factor other than altitude and latitude that varies systematically across the Dome. Preliminary data discussed here are compatible with spatially variable katabatic winds that could control the winter temperature-inversion strength to provide a large part of the signal. This has implications for paleoclimate studies. Variations of the stable isotopes $\delta^{18}O$ and δD from ice cores are a proxy for paleotemperature. The isotope thermometer is calibrated by comparing local isotope ratios with corresponding measured temperatures. In order to derive a useful isotope-temperature calibration, one must understand the processes that control the modern spatial variability of temperature. In order to quantify past changes in local climate, one must also understand processes that influence local spatial variability. If these processes differed in the past, ice-core climate reconstruction would be affected in two ways: through alteration of the geochemical record and through alteration of deep ice and firn temperatures. (Auth. mod.)

F-52924

Osada, K., **Seasonal variations of major ionic concentration levels in drifting-snow samples obtained from east Dronning Maud Land, East Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.226-230, 21 refs.

Drifting-snow samples were collected at Mizuho Station from Feb. to Oct. 1986, and along traverse routes in east Queen Maud Land from Oct. 1986 to Jan. 1987. Measurements for Cl^-, NO_3^-, SO_4^{2-} and Na^+ were made on the snow samples by ion chromatography. Oxygen-isotope ratios were also measured on the samples. Concentrations levels of NO_3^- and SO_4^{2-} show distinctive seasonal variations: high in summer (4.6 neq/g for NO_3^- and 3.3 neq/g for SO_4^{2-}) and low in winter during mid-Mar. to mid-Nov. (1.0 neq/g for NO_3^- and 0.5 neq/g for SO_4^{2-}). Results obtained at Mizuho show that the transition from the summer high values to winter low values takes about 20 d for NO_3^-. The variations in Cl^- and Na^+ concentration levels are small in both autumn and spring; averages are about 1 neq/g with greater variability throughout the rest of the year. The intensive-sampling data set shows that there is considerable variability within a day with NO_3^- and SO_4^{2-} concentration levels up to about a factor of 4 associated with a 10 per mill change in $\delta^{18}O$ ratios. (Auth. mod.)

F-52925

Gow, A.J., **Post-drilling recrystallization of the Byrd Station deep ice core and its relevance to current and future deep-core drilling on polar ice sheets,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.231-236, 4 refs.

Cores of highly strained ice recovered from depths of 1200-1800 m at Byrd Station in 1967-68 have been found to have recrystallized while in storage in the United States. Such recrystallization, inferred to have occurred when temperatures in the storage facility rose above about -14°C, would not have been discovered if thin sections of the cores had not been prepared and photographed at the drill site within hours of pulling the cores to the surface. It was only after new sections of the long-stored cores were compared with the original sections that the full extent of recrystallization was revealed. The recrystallized structure emulates in both texture and fabric those observed in naturally annealed ice in the bottom 350 m at Byrd Station. It is concluded that polar ice cores should be stored at temperatures of -20°C or colder in order to inhibit or minimize post-drilling recrystallization. (Auth.)

F-52926

Gow, A.J., Govoni, J.W., **80 year record of retreat of the Koettlitz Ice Tongue, McMurdo Sound, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.237-241, 12 refs.

A survey of ice-front changes since 1910-13 shows that the Koettlitz Ice Tongue, located along the western shore of McMurdo Sound, has undergone significant retreat during the past 80 years. The ice front in 1910-13 was located 5 km in front of the Dailey Is. Today, only two of the six Dailey Is. remain connected to the Koettlitz Ice Tongue. The most recent break-out of ice is believed to have occurred in 1979 or 1980, resulting in an estimated loss of 80 km^2 of ice. Based on the current position of the ice front, it is estimated that a minimum of 300 km^2 of ice has calved off the Koettlitz Ice Tongue during the 80 year period that has elapsed since the ice front was first mapped in 1910-13. (Auth.)

F-52927

Takahashi, S., Ageta, Y., Fujii, Y., Watanabe, O., **Surface mass balance in east Dronning Maud Land, Antarctica, observed by Japanese Antarctic Research Expeditions,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.242-248, 17 refs.

The surface mass balance in east Queen Maud Land has been observed mainly by means of the snow-stake method. The surface mass balance generally decreased with distance from the coast; from more than 250 mm/a in the coastal region to less than 50 mm/a in the inland region above 3500 m in altitude. At Mizuho Station, the sublimation was about 50 mm/a, precipitation was between 140 and 260 mm/a, and the loss from the surface by the redistribution was estimated to be about 100 mm/a, which agrees with the surface mass balance estimated as 70 mm/a from the grain-growth rate. Around the mountainous area, the balance was small or in some cases negative, where a bare-ice field has developed. In the inland area 3000-3200 m a.s.l. the surface mass balance was less than 50 mm/a. This low mass-balance area can be explained by redistribution from drifting snow. The whole mass input in 5 drainage basins, with a total area of 620×10^3 km^2, is 61.2 Gton/a; the mean surface mass balance is 99 mm/a. (Auth.)

F-52928

Casassa, G., Whillans, I.M., **Decay of surface topography on the Ross Ice Shelf, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.249-253, 19 refs.

The time decay of surface undulations is modeled analytically. The particular application is the decay of flow stripes on the Ross Ice Shelf that emanate from Byrd Glacier. The model predicts two extreme undulation types. One extreme, which is termed the buckle solution, has a decay time of only 13 years. The other, the pinch-and-swell case, can persist much longer (700 years), because each surface ridge is underlain by deep roots. Flow stripes may originate as a combination of both the buckle and pinch-and-swell extremes, but only the pinch-and-swell aspect is predicted to survive in the ice shelf. The predicted decay time and that measured from satellite imagery are in close agreement. (Auth.)

F-52929

Hulbe, C.L., Whillans, I.M., **Evaluation of strain rates on Ice Stream B, Antarctica, obtained using GPS phase measurements,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.254-262, 30 refs.

The "stop-and-go" kinematic Global Positioning System (GPS) technique was used to survey 270 stations twice within a 25 km by 10 km strain grid on the surface of Ice Stream B. One or two geodetic quality receivers operated as reference pivots, while two similar receivers traveled to grid stations. Each station was occupied for 25 s. Each survey was completed within 2 weeks. Calculated horizontal strain rates are accurate to 1%, and relative vertical velocities are accurate to 20 mm/km/a. Maps of the four horizontal velocity gradients, relative vertical velocity and surface elevation are presented. The vertical velocity pattern is used to identify the part of the topography that forms stationary waves and that which is migrating. No strong quantitative link is found between the pattern in horizontal strain rate and surface topography. In particular, there is no evidence that the topography is relaxing toward isostasy. (Auth. mod.)

F-52930

Hulbe, C.L., Whillans, I.M., **Method for determining ice-thickness change at remote locations using GPS,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.263-268, 18 refs.

Ice-thickness changes at remote locations on ice sheets can be determined by means of precise Global Positioning System (GPS) surveys with interferometric solutions. Remote sites are precisely surveyed relative to GPS receivers on rock. Repeat observations of the position of a remote site provide its vertical velocity. The difference between this velocity and accumulation rate is an indicator of change in ice-sheet thickness. Allowance must be made for the movement of survey markers due to firn compaction and down-slope ice motion. To allow for firn compaction, very long poles are placed to a sufficient depth in the firn that the densification rate can be considered steady. This assumption may be tested by measurements with poles set to different depths. (Auth. mod.)

F-52931

Chinn, T.J., **Glacier disequilibrium in the Convoy Range, Transantarctic Mountains, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.269-276, 19 refs.

Field work on a geological map of the Convoy Range included mapping of glaciers, moraines and surficial deposits. A range of glaciological indicators, including supraglacial and other moraines and margin morphology, has been used to assess the present equilibrium of the glaciers. Fields of rafted supraglacial moraine have accumulated over long periods of time at specific low-gradient, low-velocity locations. As the glacier regime changes, the shape of the moraine field distorts, signalling a change in flow pattern. By reversing the ice-flow vectors directed at the moraine field, the directions from whence the debris came are shown. Examination of the contortions of supraglacial moraine fields reveals the nature of the changes in glacier regime. Moraine-field configurations all suggest that local glaciers are expanding in response to higher local precipitation, estimated to have occurred between 2000 and 8000 year bp, most likely coincident with the world-wide "climate optimum" of about 6000 year bp. (Auth. mod.)

F-52932

Castelnau, O., Duval, P., **Simulations of anisotropy and fabric development in polar ices,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.277-282, 27 refs.

The preferred orientation of ice crystals in polar ice sheets develops as a result of intracrystalline slip. Polycrystalline plasticity theory has been successfully used to simulate development of fabrics in rocks. In this study, the authors present a simple theory for plastic deformation and fabric evolution. Each crystal within the aggregate is assumed to deform only by basal glide, and recrystallization processes are not directly taken into account. The authors have adopted the uniform stress bound, that is, stress is supposed to be homogeneous in the polycrystal. Simulated fabrics in uniaxial compression and tension are similar to those observed in ice sheets. It is suggested that effects of vertical compression and/or rotation recrystallization are of great importance for fabric evolution in polar ice sheets. The proposed model can reproduce viscosities of anisotropic ice samples tested in compression or tension but it is not able to reproduce the low viscosity of ices with a single-maximum fabric when tested in simple shear. (Auth. mod.)

F-52933

Minikin, A., Wagenbach, D., Graf, W., Kipfstuhl, J., **Spatial and seasonal variations of the snow chemistry at the central Filchner-Ronne Ice Shelf, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.283-290, 37 refs.

The chemical stratigraphy of the surface firn of the central Filchner-Ronne Ice Shelf was determined in conjunction with stable isotopes from shallow firn cores and snow-pit samples collected at 15 widely distributed sites, and covering a time period of at least 20 years. Throughout the investigated area, wintertime nss sulphate levels are found to be substantially negative, indicating that the sulphate to sodium ratio in airborne sea-salt particles is depleted by a factor of 5, approximately, in relation to the bulk sea-water ratio. While winter firn layers appear to be marked by episodic events of large sea-salt inputs, pronounced annual cycles with maxima in summer firn layers are commonly observed for the ECM signal and for nss sulphate, nitrate and methanesulphonate (MSA) at all sites. It is concluded that the sea-salt and the biogenic sulphur compounds deposited on the Filchner-Ronne Ice Shelf mainly originate from the adjacent Weddell Sea. (Auth. mod.)

F-52934

Budd, W.F., Jenssen, D., Mavrakis, E., Coutts, B., **Modelling the antarctic ice-sheet changes through time,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.291-297, 20 refs.

A new assessment is made of the possible range of responses of the antarctic ice sheet to future global warming by performing a series of sensitivity tests to prescribed climatic forcing with an ice-sheet model. To obtain an appropriate initial present state for the ice sheet, it has been necessary to perform a series of simulations through the last glacial cycle with prescribed forcing including accumulation, sea level and, less importantly, climatic temperature. For future climatic forcing, General Circulation Model simulations have been used with particular concern for the changes in the sea-ice cover and ocean warming. Effects of progressive changes have been examined with increases of basal-melt rates up to 10 m/a, surface annual mean temperatures by up to 7°C and surface-accumulation rates to double the present values. Without additional accumulation, the increased basal melt of 10 m/a would greatly reduce the ice shelves and contribute to sea-level rise of 0.3 m in 100 years and over 0.6 m by 500 years. The additional accumulation offsets this to give ca. zero change by 100 years and -1.2 m by 500 years. (Auth. mod.)

F-52935

Takizawa, T., Ohshima, K.I., Ushio, S., Kawamura, T., Enomoto, H., **Temperature structure and characteristics appearing on SSM/I images of the Cosmonaut Sea, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.298-306, 4 refs.

Water-temperature structure shows that cold water with a temperature below -1.5°C was present in the coastal region of Enderby Land. Circumpolar Deep Water with a temperature higher than 1.0°C was found below about 150 m depth from northeast to northwest of the coldwater area. The SSM/I images in 1987-91 indicate that polynya activities were intensive in 1988 and the typical Cosmonaut Polynya was observed. Due to weaker activities, the small and sporadic Cosmonaut Polynya formed in 1987, 1989, 1990 and 1991. A coastal polynya was frequently observed yearly at about 66°S, 50-60°E. A train of polynyas to the east of Cosmonaut Polynya often appeared. It is concluded that the Atmospheric Convergence Line and Antarctic Divergence Region are responsible for polynya activities in the area investigated. (Auth. mod.)

F-52936

Wagenbach, D., et al, **Reconnaissance of chemical and isotopic**

firn properties on top of Berkner Island, Antarctica, *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.307-312, 14 refs.

Shallow firn cores were drilled to 11 m at the two main summits of Berkner I. and analyzed in high depth resolution for electrical d.c. conductivity (ECM), stable isotopes, chloride, sulphate, nitrate and methane-sulphonate (MSA). From the annual layering of δD and non-sea-salt (nss) sulphate, a mean annual snow accumulation of 26.6 cm water at the north dome, and 17.4 cm water at the south dome, are obtained. As a result of ineffective wind scouring indicated by a relatively low near-surface snow density, regular annual cycles are found in the upper 4-5 m. Post-depositional changes are responsible for a substantial decrease of the seasonal δD and nitrate amplitude as well as for considerable migration of the MSA signal operating below a depth of 3-4 m. The mean chemical and isotopic firn properties at the south dome correspond to those on the Filchner-Ronne Ice Shelf at a comparable distance to the coast; the north dome is found to be much more influenced by maritime air masses. Persistent high sea-salt levels in winter snow at Berkner I. heavily obscure the determination of nss sulphate. (Auth. mod.)

F-52937

Scambos, T.A., Echelmeyer, K.A., Fahnestock, M.A., Bindschadler, R.A., **Development of enhanced ice flow at the southern margin of Ice Stream D, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.313-318, 9 refs.

A combination of image-based velocity mapping techniques and finite-element modeling has been used to study a part of the southern shear margin of Ice Stream D. The study area is a region over which the margin shows considerable development morphologically, where a new southern margin is forming in response to an abrupt increase in ice-stream width just upstream of the study area. A series of ice-speed profiles perpendicular to the margin was determined by semi-automated displacement measurements of small ice features in sequential Landsat TM images. Finite-element modeling of the upstream and downstream profiles suggests that a considerable change occurs in the stiffness of the ice in the marginal zone between the two profiles, and in the stiffness or amount of sliding in the basal layer underlying the margin. Ice in the downstream profile appears to have marginal zones of softer ice in which shear strain is concentrated and uniformly low resistance to deformation in the bed. (Auth. mod.)

F-52938

Bindschadler, R.A., Fahnestock, M.A., Skvarca, P., Scambos, T.A., **Surface-velocity field of the northern Larsen Ice Shelf, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.319-326, 6 refs.

Three satellite images of the northern Larsen Ice Shelf are used to derive velocity fields for the periods 1975-86 and 1986-89. Substantial increases in the speed of the ice between these periods were detected to a high degree of confidence. Ice which entered the ice shelf between Fothergill Point and Cape Worsley and ice from Drygalski Glacier have accelerated by approximately 15% over the measurement period. Ice from Bombardier and Dinsmoor Glaciers also exhibit acceleration but by a lesser amount. These accelerations may be the result of either significant retreat experienced by the ice shelf during this period or warming in the Antarctic Peninsula region. Velocities measured by surface survey over a 15 d period in 1991 indicate a slower velocity than the image-derived velocities in the limited region of overlap. These differences appear to be systematic and may be the result of uncontrolled errors in the surface survey. (Auth.)

F-52939

Bindschadler, R.A., Vornberger, P.L., **Detailed elevation map of Ice Stream C, Antarctica, using satellite imagery and airborne radar,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.327-335, 12 refs.

Surface elevations collected by airborne radar are interpolated between flight lines using Landsat TM image data to produce a detailed digital elevation model of part of Ice Stream C. The photoclinometric method developed is general and allows the derivation of surface elevation along any line parallel to the solar illumination from a single known elevation on that line. Accuracies of the derived elevations are improved with additional elevation control that permits an empirical determination of parameters in the photoclinometric equation accounting for albedo and atmospheric scattering. Elevation errors increase approximately linearly with the integration distance. An explicit relationship is derived that shows the image brightness is insensitive to the cross-Sun component of small surface slopes typical of ice sheets. (Auth. mod.)

F-52940

Huybrechts, P., **Formation and disintegration of the antarctic ice sheet,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.336-340, 22 refs.

A model of the antarctic ice sheet has been used to simulate the ice sheet in warmer climates. The results of these experiments reveal the considerable stability of the East Antarctic ice sheet. It would require a temperature rise of between 17 and 20 K above present levels to remove this ice sheet from the subglacial basins in the interior of the continent, and of 25 K to melt down the antarctic ice sheet completely. For a temperature rise less than 5 K the model actually predicts a larger antarctic ice sheet than today as a result of increased snowfall, whereas the West Antarctic ice sheet was found not to survive temperatures more than 8-10 K above present values. Furthermore, basal temperature conditions in these experiments point to the problems involved in raising the base of the ice sheet to the pressure-melting point over the large areas necessary to consider the possibility of sliding instability. In view of these findings, it is difficult to reconcile a highly variable East Antarctic ice sheet until the Pliocene with modest warming recorded in, for instance, the deep-sea records for the late Neogene. (Auth. mod.)

F-52941

Moore, I., Mobbs, S.D., Ingham, D.B., King, J.C., **Numerical model of blowing snow around an antarctic building,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.341-346, 10 refs.

This paper studies a building at a station run by the British Antarctic Survey and located on the Brunt Ice Shelf. Four previous stations have been built in the area, the buildings of which were designed to become covered in snow and all have been crushed within a few years. The current station, Halley V, consists of three buildings which are all raised from the ice shelf on legs. They were designed in such a way that wind blowing underneath the buildings would keep them clear of snow. This paper describes a model which predicts the shape and position of drift formation, and then compares the results with those observed at Halley. The model is a first attempt to address the problem and as such the paper can be considered to be a progress report; improvements are currently being made as part of continuing research. (Auth. mod.)

F-52942

Sievers, J., et al, **Validating and improving elevation data of a satellite-image map of Filchner-Ronne Ice Shelf, Antarctica, with results from ERS-1,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.347-352, 16 refs.

A satellite-image map with surface-elevation contours of Filchner-Ronne Ice Shelf has been published previously as a topographic map. The image map was constructed from a mosaic of 69 Landsat Multispectral Scanner (MSS) images and NOAA AVHRR data. The standard deviation in position in the central part of the mosaic is ±125 m. Topographic-glaciologic features were taken from Landsat scenes and represent the best coastline of this region. Surface elevations have been calculated from airborne and ground measurements of either ice thickness or barometric pressure. Accuracies vary from ±2 to ±7 m. Oversnow trigonometric levelling in the northeastern part of the ice shelf, tied to sea level at the ice front, has achieved accuracies of ±1 m. Accuracies reduce to about ±20 m in the grounded ice areas. (Auth. mod.)

F-52943

Smith, A.M., Doake, C.S.M., **Sea-bed depths at the mouth of Rutford Ice Stream, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.353-356, 14 refs.

Seismic measurements of ice- and water-column thickness have been made on Rutford Ice Stream where it joins the Ronne Ice Shelf. Assuming that the ice is in hydrostatic equilibrium, these values have been used to calculate sea-bed elevations. A sea-bed trough more than 2 km below sea level along the western margin continues downstream from the grounded to the floating ice. (Auth.)

F-52944

Bamber, J.L., Bentley, C.R., **Comparison of satellite-altimetry and ice-thickness measurements of the Ross Ice Shelf, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.357-364, 28 refs.

The launch of ERS-1 provides coverage by satellite altimetry of a large part of the Ross Ice Shelf including areas of input from Byrd Glacier and Ice Streams D and E. Five 35 d repeats of fast-delivery data comprising approximately 100,000 height estimates have been used to produce a Digital Elevation Model (DEM) of the Ross Ice Shelf north of 81.5°S. Two of the latest geoid models, OSU91-A and JGM1, were compared with the available in situ data and hydrostatic models based on ice and water densities. The altimetry was compared with ice-thickness data from Ross Ice Shelf Geophysical and Glaciological Survey (RIGGS) stations and Scott Polar Research Institute radio-echo-sounding surveys undertaken in the 1970s. Differences between the DEM and heights calculated from ice thicknesses and a standard density-depth equation lie, in general, within the combined measurement errors. There are, however, several areas where this is not the case. Prominent north-south stripes of different ice thickness shown on a RIGGS map apparently do not exist. (Auth. mod.)

F-52945

Blindow, N., **Central part of the Filchner-Ronne Ice Shelf, Antarctica: internal structures revealed by 40 MHz monopulse RES,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.365-371, 13 refs.

About 1200 km of surface-based radio-echo sounding (RES) profiles were measured during the German Antarctic field season 1989-90 on the Filchner-Ronne Ice Shelf (FRIS). In the area investigated downstream of Doake Ice Rumples and Henry Ice Rise, a basal layer of marine ice up to 400 m thick was found below the meteoric ice, which is less than 100 m thick in some places. The continuous profiling yielded the total ice thickness in the northern part and a variety of internal structures, including layers in the meteoric and the marine ice, remnants of crevasses, and varying reflections of the meteoric-marine interface reflection (MMR). It is shown that the most-disturbed MMR signatures originate at grounding zones at Doake Ice Rumples and at both sides of Henry Ice Rise. The status of the meteoric ice bottom is preserved by the formation of marine ice; structures remain widely unchanged over 400 km of flow. Internal features that can be correlatd on parallel profiles perpendicular to the flow provide an independent means for the construction of flowlines. (Auth. mod.)

F-52946

Vaughan, D.G., **Investigating tidal flexure on an ice shelf using kinematic GPS,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.372-376, 17 refs.

The positions of ice-stream grounding zones are uniquely sensitive to changes in the mass balance of the ice sheet. Present methods for locating grounding-zone features are either imprecise or require considerable effort in interpretation. The authors present a new method which uses the kinematic GPS technique to locate the position of the limit of tidal flexure. The method involves the collection of at least two surface-elevation profiles along the same track through the grounding zone at different times during the tidal cycle. The elevation profiles obtained coincide upstream of the limit of flexure but diverge downstream of the limit of flexure. Subtracting the profiles produces a tidal-deflection profile which shows directly the response of the ice shelf to the tidal forcing. Two examples are given of the use of this method, both on Rutford Ice Stream. The first is across the grounding zone and shows that the method is capable of measuring grounding positions to around 200 m precision. The second, taken across an active shear margin, shows a tidal-deflection profile, with an absence of steps that would indicate the presence of fracture planes penetrating from the ice base to sea level. (Auth.)

F-52947

Grosfeld, K., Thyssen, F., **Temperature investigation and modeling on the Filchner-Ronne Ice Shelf, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.377-385, 49 refs.

During the German Antarctic Expedition field season 1989-90, hot-water drilling was done on the Filchner-Ronne Ice Shelf (FRIS) to investigate the temperature-depth profile and the bottom-melting rate, which are significant parameters for mass- and energy-balance studies of the ice shelf. Remeasurements of chains installed in 1991-92 yielded reliable results. Taking glaciological, geodetic and geophysical data on a flowline through the central part of FRIS, the authors developed a two-dimensional thermal model to reconstruct the measurements from a steady-state temperature-depth profile ca. 550 km upstream on Möllereisstrom. A basal layer of 350 m of marine ice was calculated with thermal properties depending on salinity and temperature. In areas with strong basal freezing, nearly isothermal depth profiles in the marine ice layer are derived. Further downstream in areas of basal melting a nearly cubic temperature-depth profile is observed. (Auth.)

F-52949

Jonas, M., Grosfeld, K., Thyssen, F., **Numerical flow simulation at local parts of Filchner-Ronne Ice Shelf, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.391-396, 24 refs.

The Münster radio echo sounding (RES) work in the central Filchner-Ronne Ice Shelf has revealed new information. Different signatures are discernible in the airborne RES data. Local model calculations in the area between Henry Ice Rise and Berkner I. are used to interpret these signatures in terms of thermal and dynamic parameters. From airborne measurements, the shapes of the meteoric and marine-ice layers were prepared as input data for dynamic-model calculations. A general increase in the temperature-dependent flow parameter is compared with a spatially variable flow parameter that is derived from model calculations concerning freezing and melting processes. Velocity and strain fields were calculated by a finite-difference method on a local data base between Henry Ice Rise and Berkner I. (Auth.)

F-52950

Frezzotti, M., Mabin, M.C.G., **20th century behaviour of Drygalski Ice Tongue, Ross Sea, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.397-400, 15 refs.

Drygalski Ice Tongue is a floating seaward extension of David Glacier. In Dec. 1956, the ice tongue was about 110 km long. By Dec. 1957, a major calving event had occurred and the outer 40 km of the ice tongue had broken away. This is the only major 20th century calving event identified, and it may have occurred during a violent storm that struck the Ross Sea area in mid-June 1957. By 1960 further minor ice loss had occurred, but since that time Drygalski Ice Tongue has maintained the same shape. In Jan. 1993, the ice tongue was 95.8 km long and at its terminus was flowing at 880-900 m/a. Drygalski Ice Tongue is an important regulator of the size of the Terra Nova Bay polynya. The average size of the polynya varied from nearly 2000 km^2 in 1956 to 650 km^2 in 1957. This has a significant impact on sea-ice production in the Ross Sea. In 1956, about 115 km^3 of sea ice would have been produced, sufficient to cover 30% of the Ross Sea area with a 1 m thickness of sea ice. (Auth. mod.)

F-52951

Hambrey, M.J., Dowdeswell, J.A., **Flow regime of the Lambert Glacier-Amery Ice Shelf system, Antarctica: structural evidence from Landsat imagery,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.401-406, 34 refs.

High-resolution visible and near-infrared satellite imagery provides a means of investigating the structural glaciology, and hence the dynamics, of large ice masses. The Lambert Glacier-Amery Ice Shelf system is one of the largest ice drainage basins in Antarctica and has previously yielded conflicting evidence concerning its dynamic behavior: either that the system has a propensity for surging or that it has a constant flow regime. Digital manipulation of Landsat imagery allows analysis of the structure of the glacier system, showing longitudinal foliation, medial moraines and crevasse patterns. These provide no evidence of surging behavior during the residence time of ice in the glacier system. (Auth.)

F-52952

Ferrigno, J.G., et al, **Landsat TM image maps of the Shirase and Siple Coast ice streams, West Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.407-412, 17 refs.

Fifteen 1:250,000 and one 1:1,000,000 scale Landsat Thematic Mapper (TM) image mosaic maps are currently being produced of the West Antarctic ice streams on the Shirase and Siple coasts. Landsat TM images were acquired between 1984 and 1990 in an area bounded approximately by 78°-82.5°S and 120°-160°W. Landsat TM bands 2, 3 and 4 were combined to produce a single band, thereby maximizing data content and improving the signal-to-noise ratio. The summed single band was processed with a combination of high- and low-pass filters to remove longitudinal striping and normalize solar elevation-angle effects. The images were mosaicked and transformed to a Lambert conformal conic projection using a cubic-convolution algorithm. The projection transformation was controlled with ten weighted geodetic ground-control points and internal image-to-image pass points with annotation of major glaciological features. The image maps are being published in two formats: conventional printed map sheets and on a CD-ROM. (Auth.)

F-52953

Determann, J., Gerdes, R., **Melting and freezing beneath ice shelves: implications from a three-dimensional ocean-circulation model,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.413-419, 32 refs.

The thermohaline circulation below a regularly shaped ice shelf comparable in dimensions to the Ronne Ice Shelf is investigated by means of a three-dimensional primitive equation model. To handle the strongly inclined ocean surface as well as the bottom topography, the authors use scaled coordinates in the vertical direction. Preliminary results of two model versions containing both open and closed open-ocean boundaries prove the internal circulation is almost independent of the hydrography outside the ice shelf. Driven only by the pressure dependence of the seawater freezing point, a stationary circulation pattern evolves, forced by buoyancy flux due to melting and freezing. The redistribution of ice from deep to shallow ice-shelf drafts resembles the ice-pump mechanism. Its strength depends on the ice-thickness gradients, namely, the differences of the freezing point at the ice-shelf base. Since simulated melting and accumulation rates convincingly reproduce the interactions observed at the base of Ronne Ice Shelf, the present model can act as a tool for coupling ice-ocean dynamics. (Auth.)

F-52954

Thompson, L.G., et al, **Climate since AD 1510 on Dyer Plateau, Antarctic Peninsula: evidence for recent climate change,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.420-426, 20 refs.

A 480 year record of the oxygen-isotope ratios, dust content, chemical species and net accumulation from ice cores drilled in 1989-90 on Dyer Plateau in the Antarctic Peninsula is presented. Unlike in East Antarctica, on Dyer Plateau conditions appear to have been fairly normal from AD 1500 to 1850, with cooler conditions from 1850 to 1930 and a warming trend dominating since 1930. Reconstructed annual layer thicknesses suggest an increase in net accumulation beginning early in the 19th century and continuing to the present. This intuitive conflict between increasing net accumulation and depleted $\delta^{18}O$ (cooler climate) in the 19th century appears widespread in the peninsula region and challenges one's understanding of the physical relationships among moisture sources, air temperatures and snow accumulation. The complex meteorological regime in the Antarctic Peninsula region complicates a meaningful interpretation of proxy indicators and results in a strong imprint of local high-frequency processes upon the larger-scale climate picture. (Auth. mod.)

F-52955

Ciais, P., Jouzel, J., Petit, J.R., Lipenkov, V.IA., White, J.W.C., **Holocene temperature variations inferred from six antarctic ice cores,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.427-436, 43 refs.

The authors have reconstructed temperature changes over the past 15,000 years from ice-core data in Antarctica, using measurements of the D/H isotope ratio in ice as a proxy of temperature for central sites (Vostok, Dome C and Komsomolskaya) as well as coastal sites. They examined the dating of each core and built up a common temporal framework for the ensemble of the data; they addressed the problem of inferring small-amplitude temperature fluctuations from the isotope data, in the light of noise-generating mechanisms involved in snow deposition. Temperature was reconstructed so as to minimize distortion created by the sampling of ice cores in the field. The 7 ice cores studied yield an average temperature curve which can be put in perspective with nearby paleoclimatic records. (Auth.)

F-52956

Paltridge, G.W., **Ice sheets and continental drift,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.437-439, 19 refs.

Cycles of ice-sheet loading during glacial periods of the Earth's history induce horizontal velocities in the uppermost mantle which may be of the same order as those of continental drift. Given some nonlinear mechanism which ensures preferential movement in the one direction, a climatically induced component of continental drift is therefore possible during glacial periods such as the Quaternary. If so, one might expect that component of drift to be intermittent on time-scales between 20 and 100 ka, i.e. on time-scales of observed ice-volume variations which, at least over the last 700 ka, have been related to the Earth's orbital variations. (Auth.)

F-52957

Mulvaney, R., Wolff, E.W., **Spatial variability of the major chemistry of the antarctic ice sheet,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.440-447, 48 refs.

A compilation of reliable data for sodium, nitrate, chloride and sulphate has been made. NO_3^- concentrations are remarkably consistent across Antarctica, though there appears to be some correlation with altitude and accumulation rate. Post-depositional loss of NO_3^- is important at low-accumulation sites. Cl^- concentration (either measured directly or calculated from Na^+ via the sea-salt ratio) decreases with distance from the coast, though the decline is less rapid if the coastal topography is not steep or mountainous. Excess sulphate (xs SO_4^{2-}) concentration (here calculated from normal sea-salt ratios with Na^+ or Cl^-) also declines with distance from the coast, though less quickly than Cl^-. Fractionation of sea-salt ions makes the calculation of xs SO_4^{2-} uncertain. (Auth.)

F-52973

Massom, R.A., **Satellite remote sensing of polar snow and ice:**

present status and future directions, *Polar record,* Apr. 1995, 31(177), p.99-114, 68 refs. Presented at the 3rd Circumpolar Symposium on Remote Sensing of Arctic Environments, Fairbanks, AK, May 16-20, 1994.

Polar snow and ice masses exert a profound influence on global climate and ocean circulation, and are in turn influenced by climate. Satellite remote sensing constitutes the only practical and systematic means of gaining long-term overviews of any change or variability that may be occurring in key snow and ice parameters. Current relevant satellite sensors are reviewed and future developments evaluated to determine how these may lead to improved retrievals of the key parameters. Sensors to be launched on satellite platforms planned for the end of the century and beyond include both improved versions of existing sensors such as MODIS (Moderate Resolution Imaging Spectrometer), and new classes of sensors (such as imaging spectrometers and laser rangers/altimeters) applied to polar remote sensing for the first time. (Auth.)

F-52978

Ghermandi, G., Meneghel, M., Sighinolfi, G.P., **Geochemical study on the Strandline Glacier, Terra Nova Bay, Antarctica,** *Comitato Glaciologico Italiano. Bollettino. Ser. 3: Geografia fisica e dinamica quaternaria,* 1993, 16(2), p.121-128, With Italian summary. 39 refs.

A chemical study was carried out on ice samples collected from the Strandline Glacier during the Italian Antarctic Expedition to Terra Nova Bay in 1989-90, in order to investigate sources and mode and type of transport of elements and compounds present. Analysis was performed on the whole sample without filtration of the particulate matter. Element abundances for both main and trace lithophile and heavy metals are much higher than literature data for polar ice and snow. Element overabundances derive from the presence of solid particles of different origin (continental terrestrial and cosmic) and of seasalt by local strong aerosol. Calculation of crustal enrichment factors suggests that the chemistry of samples from the frontal zone is essentially controlled by the amount of rock particles from the substratum enveloped in the glacier during its movement. In contrast, the chemistry of the surface ice samples derives from atmospheric or tropospheric introduction of dissolved constituents and solid particles of different origin (primary marine aerosol, continental and cosmic dust, etc.). (Auth. mod.)

F-52985

Lisano, M.E., II, Schutz, B.E., **Preliminary study of height and pointing calibration scenarios for satellite laser altimetry of continental ice sheet topography,** *Astrodynamics 1993: Advances in the astronautical sciences,* 1994, 85(3), p.2677-2687, 16 refs.

DLC TL787.A6A2

It is planned to use height measurements made with a satellite laser altimeter, such as the Geoscience Laser Altimeter System (GLAS) of the Earth Observing System (EOS) to infer changes in the volume of the Greenland and antarctic ice sheets. Two methods for calibrating satellite laser altimeter pointing knowledge and height measurements of the continental ice sheets are examined in this preliminary study. One calibration method is based on locating the altimeter satellite position with the Global Positioning System (GPS); the second method is based on tracking the satellite using ground-based satellite laser ranging (SLR). This investigation suggests that a feasible calibration strategy using Altimeter Footprint Detector Arrays (AFDA's) will be to deploy small, mobile arrays at the highest latitudes flown over by the satellite, and that the size of these arrays will depend strongly on the predicted satellite position cross-track error as a function of time. Future work is proposed, based on the AFDA concept and calibration algorithms. (Auth. mod.)

F-53057

Warren, S.G., Brandt, R.E., Boime, R.D., **Blue ice and green ice,** *Antarctic journal of the United States,* 1993, 28(5), p.255-256, 8 refs.

The authors' particular reason for measuring the spectrum of blue ice was for comparison with their previous measurements of a green iceberg. Green ice apparently forms by the freezing of seawater to the base of ice shelves. It differs from sea ice at the ocean surface in that it contains almost no salt and no bubbles. A figure shows the measured albedo as a function of wavelength for the blue ice, as well as that of snow and of a green iceberg. The albedo of the blue ice is surprisingly high due to the large number of bubbles. The reflectance spectrum of the green iceberg differs from that of the blue glacier ice in two respects: its peak wavelength is slightly longer (500-520 nm vs. 470-500 nm), and the reflectance is lower at all wavelengths.

F-53058

Carlson, R.W., Arakelian, T., **Spectral bidirectional reflectance and energy absorption rates of antarctic snow,** *Antarctic journal of the United States,* 1993, 28(5), p.256-258, 5 refs.

During the past four austral summers, the authors have investigated the visible and NIR spectral and angular scattering properties of snow at Amundsen-Scott Station, Byrd Surface Camp and Vostok Station. In this paper they highlight some of the results and discuss the spectral dependence of the solar energy absorption rate and the angular scattering profiles at visible and NIR wavelengths. The general spectral properties of antarctic snow are illustrated in a figure, which shows a typical reflectance spectrum at the South Pole with the sun at approximately 23° elevation angle and nadir viewing. Also shown are theoretical bidirectional reflectance curves for various snow grain radii.

F-53077

Péwé, T.L., **Augustana Glacier and Augustana Creek, Alaska, and Lake Fryxell, Antarctica,** *Augustana College Library Publications,* 1992, No.36, Earth interpreters: F.M. Fryxell, geology, and Augustana. Edited by D.A. Schroeder and R.C. Anderson, p.49-59, Refs. p.57-58.

DLC QE38.E27

The general setting and description of Lake Fryxell, a permanently ice covered lake in the lower part of Taylor Dry Valley, its scientific significance and the origin of its name, are presented.

F-53084

Key, J., Maslanik, J.A., Steffen, K., **Ice surface temperature retrieval from AVHRR, ATSR, and passive microwave satellite data: Algorithm development and application,** *U.S. National Aeronautics and Space Administration. Contract report,* Mar. 23, 1994, NASA-CR-195276, 18p., N94-27849, 7 refs.

One essential parameter used in the estimation of radiative and turbulent heat fluxes from satellite data is surface temperature. Over the ice, the surface within a single satellite pixel is likely to be highly heterogeneous, a mixture of the ice of various thicknesses, open water, and snow cover in the case of sea ice. Additionally, the Arctic is cloudy, with typical cloud cover amounts ranging from 60-90%. There are few observations of cloud cover amounts over Antarctica. The goal of this research is to increase the knowledge of surface temperature patterns and magnitudes in both polar regions, by examining existing data and improving the ability to use satellite data as a monitoring tool. Four instruments are of interest in this study: the AVHRR, ATSR, SMMR, and SSM/I. The authors refine the existing AVHRR retrieval algorithm, defined in Key and Haefliger (1992) and applied elsewhere; they develop a method for IST retrieval from ATSR data similar to the one used for SST, and investigate the possibility of estimating surface temperature from passive microwave data (in conjunction with AVHRR clear sky samples) through the use of 'effective emissivities' and physical relationships between skin temperature and subsurface temperature.

F-53090

Abdalati, W., Steffen, K., Otto, C., Jezek, K.C., **Comparison of brightness temperatures from SSMI instruments on the DMSP F8 and F11 satellites for Antarctica and the Greenland ice sheet,** *International journal of remote sensing,* May 10, 1995, 16(7), p.1223-1229, 5 refs.

Passive microwave satellite data provide extremely important information about the climate and surface conditions in the often cloudy high latitude regions of the Earth. Multichannel passive microwave data have great potential for long-term climate monitoring. In order to ensure consistent data sets for such long-term monitoring, the relations between the microwave brightness temperatures from similar sensors on successive satellite platforms must be understood. In this study the 19, 22 and 37 GHz channels of the Defense Meteorological Satellite Program F8 and F11 Special Sensor Microwave Imager instruments are compared, employing data derived from both Antarctica and Greenland. While the analysis shows that the two data sets are highly correlated with correlation coefficients greater than 0.98, the consistency between the two data sets can be improved by applying small corrections on the order of 1° K. (Auth. mod.)

F-53097

Han, J.K., Wen, J.H., Shang, X.C., Jin, H.J., **Temperature distribution in Collins Ice Cap, King George Island, Antarctica,** *Antarctic Research (Chinese edition),* Mar. 1995, 7(1), p.59-66, In Chinese with English summary. 6 refs.

Borehole temperature measurements show that Collins Ice Cap has characteristics of a temperate glacier in most parts of the accumulation area, but it is characterized as cold glacier in the ablation area. The ice temperature of the active layer is noticeably affected by seasonal variations of air temperature. The water infiltrating and warming is very significant at a depth of 30 m; the snow cover also has an effect on temperature distribution. The data reveal that the ice temperature in deep layers is at the freezing point: the temperature varies greatly in the vicinity (10-20 m) of the Little Dome. (Auth. mod.)

F-53103

Whillans, I.M., Tseng, Y.H., **Automatic tracking of crevasses on satellite images,** *Cold regions science and technology,* Feb. 1995, 23(2), p.201-214, 23 refs.

Measurements of glacier motion and deformation are obtained by automatically matching features, such as crevasses, on repeat images. A computer-based method identifies and tracks groups of features on successive images and calculates their displacement and the rotation and distortion of the ice. Ice deformation within each matched area is permitted and calculated using a least-squares method within each area. The method is applied to SPOT satellite images of Ice Stream B. A quality-checking scheme rejects inappropriate matches. The results compare satisfactorily with velocities obtained by manual methods from repeat photography of the same region. (Auth. mod.)

F-53123

Romanov, A.A., Korotkov, A.I., **Research on Antarctic sea ice** [Ob issledovaniiakh morskikh antarkticheskikh l'dov], *Rossiĭskaia akademiia nauk. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ.,* July 1992, Vol.75, p.82-85, In Russian with English summary. 8 refs.

DLC GB2401.M37

Development of reliable methods of long-term predictions of ice conditions for navigation in antarctic waters is discussed as an important objective of the studies of ice regime in the southern ocean. The comprehensive interrelated and interacting ice surveys are discussed. Regional problems of ice studies in the Weddell Sea are specified with regard to the draft of the "Ice" section in the national part of the International Programme of "Antarctic zone" studies. (Auth.)

F-53124

Nikolenko, A.V., **Mass transfer in the surface snow layer in central Antarctica** [Massoperenos v pripoverkhnostnoĭ snezhnoĭ tolshche Tsentral'noĭ Antarktidy], *Rossiĭskaia akademiia nauk. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ.,* July 1992, Vol.75, p.89-93, In Russian with English summary. 8 refs.

DLC GB2401.M37

Results of experimental measurements of mass transfer by water vapor diffusion through snow cover in the vicinity of Vostok Station are presented. Changes in the annual mass balance and snow density with depth have been evaluated. The data testify to the possible deformation of snow density profile versus depth under the effects of water vapor diffusion. The possible agents determining this phenomenon are analyzed. The possibility of deformation of temperature and density profiles in the near-surface snow sequence due to snow metamorphism is shown.

F-53174

Delaney, A.J., Arcone, S.A., **Detection of crevasses near McMurdo Station, Antarctica with airborne short-pulse radar,** *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1995, 20p., ADA-295 072, 13 refs.

Airborne short-pulse radar is evaluated experimentally as a rapid reconnaissance tool for locating snow-bridged crevasses. An immediate need for a crevasse detector is present within the U.S. Antarctic Program, which is planning a major surface traverse from McMurdo to deliver construction materials to Amundsen-Scott Station. This feasibility study of a crevasse detection system was performed near McMurdo Station in Jan. 1994. The radar utilized pulses centered near 200 and 500 MHz and was operated from a low flying helicopter with altitude and speed as variables. A global positioning system (GPS) was used for survey control. Results are presented over glacial ice on Ross I. and at various locations on the Ross Ice Shelf near White and Black Is. and near the Aurora Glacier terminus. Strong evidence of crevassing was recorded at flight speeds near 45 mph, at altitudes near 15 m, and at a data acquisition rate of 51 scans/second. Crevasses are detected by the reflections and diffractions from distorted layering in snow bridges, and by the strong diffractions from within the crevasses. The strongest diffractions apparently emanated from within the crevasse and not from the base of the snow bridge. Along the control line, a crevasse with no surface expression was detected by radar and verified by probing and digging. Transects devoid of crevasses show layering without the small scale distortion seen over snow bridges. (Auth. mod.)

F-53196

Cao, C., Qin, D.H., Liu, F.J., **Origin mechanisms of nitrate (NO_3^-) ions in antarctic surface snow,** *Chinese science bulletin,* May 1995, 40(9), p.790-792, 3 refs.

This paper demonstrates that the origin mechanisms of nitrate ions in antarctic surface snow are the ionization processes in polar middle and upper atmosphere driven by energetic particles and emission from space. The NO_3^- unique space distribution in antarctic snow and ice is a combined result of many factors involving polar particle precipitation, ionization effects, vertical transport in the middle and upper atmosphere, polar vortex and polar stratospheric clouds. (Auth. mod.)

F-53197

Qin, D.H., Ren, J.W., Sun, J.Y., Chen, D.Y., Wen, K.L., Li, L.Q., **Concentration and environmental significance of lead in surface snow of antarctic ice sheet (III),** *Science in China B,* May 1995, 38(5), p.632-640, 14 refs.

The lead concentration in surface snow of the antarctic ice sheet (corresponding to modern precipitation) has systematically been studied applying LEAF technique. The distribution principle of lead concentration of surface snow of the antarctic ice sheet is "low in the west and high in the east" along the route of the 1990 International Trans-Antarctic Expedition. The concentration of lead in East Antarctica is 2-3 times higher than that in Larsen Ice Shelf and the Antarctic Peninsula, which results primarily from the activity of pre-Soviet Antarctic Expedition. The concentration of lead in Larsen Ice Shelf and the Antarctic Peninsula can be regarded as the background value of modern precipitation of the antarctic ice sheet at the end of 1980s. (Auth. mod.)

F-53237

Honjou, T., Sano, H., **Huge CO_2 storage in antarctic ice sheet,** *Energy conversion and management,* June-Sep. 1995, 36(6-9), International Conference on Carbon Dioxide Removal, 2nd, Kyoto, Japan, Oct 24-27, 1994. Proceedings, p.501-504.

This paper describes a CO_2-storage system using artificial ice-caving within the antarctic ice sheet. It indicates the feasibility for the storage of dry-ice CO_2 in Antarctica. (Auth. mod.)

F-53246

Higham, M., Reynolds, M., Brocklesby, A., Allison, I., **Extracts from the official report "Ice radar digital recording, data processing and results from the Lambert Glacier Basin traverses",** *Aurora,* June 1995, 14(4), p.15-17.

A digital recording system is described for the ANARE 100 MHz ice radar, which has been used successfully over four field seasons during a glaciological traverse around the hinterland of the Lambert Glacier Basin. The resultant data have been analyzed to provide information on both basal and internal layer reflections from the ice sheet. The major sub-glacial topographic feature along the route is a 350 km wide graben-like trough south of the Prince Charles Mountains. The two major ice streams in the basin, the Lambert and Mellor Glaciers, lie within this trough which at its deepest is 1150 m below sea level. With the exception of this, the bedrock around the route is generally above sea level. Sub-glacial upland areas are located west of the North Prince Charles Mountains, apparently linking these with the Hansen Mountains to the northwest, and to the east of the Grove Mountains. (Auth. mod.)

F-53251

Yao, T.D., Qin, D.H., **Distribution of stable isotopes in antarctic surface snow,** *Chinese science bulletin,* June 1995, 40(11), p.921-925, 5 refs.

Used as climatic indicators, stable isotopes provide a very powerful tool for reconstructing paleoclimate. The established model with regard to the relationship between stable isotopes and temperature based on data obtained from Dumont d'Urville Station to Dome C in Antarctica has been widely used in ice core research. Does a modeling based on one point or one profile in Antarctica fit other parts of the continent? To answer this question, it is necessary to collect a number of samples covering a large part of the Antarctic. The 1990 International Trans-Antarctica Expedition provided a substantial opportunity for such a solution. (Auth. mod.)

F-53261

Wingham, D.J., **Obtaining more accurate measurements of ice sheet topography and mass-balance with satellite radar altimetry,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.43-46, 18 refs.

In this report the author summarizes new approaches to obtaining accurate surface topography and mass-balance observations with satellite pulse-limited altimeters. These approaches replace the current procedure known as "retracking" with new procedures that are different for the two measurements. The status of practical work applying these new methods to the ERS-1 altimeter measurements is described. (Auth.)

F-53262

Ridley, J.K., Rapley, C.G., **Satellite microwave observations of antarctic firn surface state,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.47-54, 8 refs.

This paper addresses observations made over the ice shelves around the Weddell Sea and the Antarctic Peninsula, where variations in the microwave properties are relatively large. Both passive microwave brightness temperature and active microwave backscatter coefficient variations are studied with a view to extracting long-term climatic variables from the data. Passive microwave observations of ice shelves show a sharp rise in brightness temperature corresponding to the onset of surface melting. Data since 1978 are compared with surface air temperature data from Halley and this is used to validate a general analysis of surface melting on several other ice shelves. This method shows a systematic increase in the number of days of melting over recent years. A K_u band scatterometer was deployed at two test sites, on the Filchner Ice Shelf and the Coats Land plateau, during summer 1991-92. The field measurements show spatial and temporal agreement in backscatter coefficient with that measured by the ERS-1 radar altimeter, and suggest that surface crusts are responsible for the differences observed at the two test sites. (Auth. mod.)

F-53263

Mobbs, S.D., Dover, S.E., **Numerical modelling of blowing snow,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.55-63, 21 refs.

A new numerical model which predicts the time evolution of profiles of blowing snow is presented. The model solves the one-dimensional boundary layer equations for wind and potential temperature using a mixing length hypothesis to determine the eddy viscosity. Balance equations are included for water vapor and snow particles. The humidity balance includes the effects of turbulent diffusion and sublimation of snow, whilst the snow particle balance includes turbulent diffusion, sublimation and settling. Close to the surface, the wind, temperature and humidity profiles are matched to classical Monin-Obukhov similarity profiles whilst for snow particles, a saltation layer is parametrized. (Auth. mod.)

F-53264

Potts, W.T.W., Reid, A.P., **X-ray microprobe studies of ice and snow,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.65-70, 11 refs.

Analyses have been made of the elemental composition of the interstitial fluid in meteoric and sea ice. The measurements were made by x-ray emission analysis of planed frozen specimens in a Jeol 840A Scanning Electron Microscope. Although the total concentrations of contaminants in meteoric ice from Dolleman I. was only 1 mg/l,sulphur, presumably in the form of sulphuric acid, was highly concentrated at triple junctions but Na and Cl were not detected. Analyses of sea ice from the Ronne Ice Shelf showed high concentrations of Na, Cl and Mg at both triple junctions and two grain boundaries, but S was not detected. Comparisons of the estimated quantities of Na and Cl concentration at the grain boundaries with the bulk composition of the sea ice suggests that up to 300 μM of NaCl was incorporated in the ice crystals. The authors suggest that only when the concentrations of NaCl exceeds this level would NaCl be segregated to the grain boundaries. This solubility of NaCl in ice would account for its absence at triple junctions in meteoric ice. (Auth. mod.)

F-53289

Wolff, E.W., Suttie, E.D., **Antarctic snow record of southern hemisphere lead pollution,** *Geophysical research letters,* May 1, 1994, 21(9), p.781-784, 19 refs.

Lead concentrations from an antarctic snow pit show the pattern of Pb reaching the antarctic atmosphere over the last 70 years. Between 1920 and 1950 the Pb concentration shows significant variations around a mean of about 2.5 ng/kg. Between 1950 and 1980 there was a clear increase to 6 ng/kg, with an apparent reduction after that. A few high concentrations in the late 1970s are probably due to local contamination from aircraft using leaded gasoline (petrol). Excluding these anomalously high values, the chronological pattern in lead concentrations can be reconciled with estimates of emissions from vehicles and metal production processes in the Southern Hemisphere. (Auth.)

F-53331

Kovacs, A., Gow, A.J., Morey, R.M., **In-situ dielectric constant of polar firn revisited,** *Cold regions science and technology,* May 1995, 23(3), p.245-256, 45 refs.

The success in using VHF and UHF systems for sounding polar ice sheets has been tempered by an uncertainty in the *in-situ* dielectric constant which controls the effective velocity of an electromagnetic wave propagating in an air-ice mixture. An empirical equation for determining the relative real dielectric constant vs. density of firn or ice was proposed in 1969 by Robin et al. where dielectric constant = $(1+0.851\rho)^2$. However, this expression has met with uncertainty because wide-angle radar refraction sounding techniques have produced dielectric constant values that are lower than Robin's equation predicts. This paper discusses radar soundings made on the McMurdo Ice Shelf and compares the resulting dielectric constant determinations with Robin's equation, laboratory measurements on firn and ice and other expressions given in the literature for determining the dielectric constant vs. the specific gravity of dry firn and ice. These findings indicate that the form of Robin's equation is valid. Reasons are suggested as to why previous wide-angle radar sounding studies did not reproduce Robin's findings. (Auth. mod.)

F-53374

Moser, H., Stichler, W., **Environmental isotopes in ice and snow,** Handbook of environmental isotope geochemistry, Vol. 1: Terrestrial environment. Edited by P. Fritz et al, Amsterdam, Elsevier Scientific Publishing Co., 1980, p.141-178, Refs. p. 174-178.

DLC QE501.4.N9 H36

Investigations based on environmental isotopes in snow and ice have been primarily focussed on deuterium and ^{18}O measurements. By adopting special methods, it is possible to follow the processes during accretion and reduction of temporary snow covers, in the course of firning of the snow, and in the transition to ice. Related glaciological and hydrological problems can be studied successfully. To differentiate the phenomena with respect to time, measurements of the tritium contents and of precipitation fall-out have been utilized. Long-term dating of information stored in the ice using radioisotopes has been carried out only in isolated cases due to great difficulties associated with methodology and measuring techniques. As a result, many conceivable applications in the field of climatology, geology, volcanology, meteorology, atmospheric chemistry, and cosmic physics have to date been only partly explored or not at all through environmental isotope studies in snow and ice. (Auth. mod.)

F-53382

Hinze, H., Seeber, G., **Aspects and results of antarctic ice shelves: velocity, flowline and deformation determination by GPS and NNSS,** International Geodetic Symposium on Satellite Positioning, Fifth, March 13-17, 1989. Proceedings, 1989, p.1006-1008, 2 refs.

Ice surface velocity parameters are derived from repeated position determination of the same station marker, e.g. a stake. Depending on the observation mode, the method of computation, the time interval between repeated measurements and the ice velocity itself different accuracy qualities are obtainable. With decreasing ice velocity or shorter intervals between the measurement epochs, the rms error of the velocity determination increases. One important aspect for field operation is that the rms error for velocity determination coming from single-point positioning with a one-year interval corresponds to results from simultaneous multistation positioning with shorter periods during a single field campaign. Both the Navy Navigation Satellite System (NNSS) and the Global Positioning System (GPS) can be used for the determination of ice velocity. In the single station mode with repeated measurements after one or more years, the capacity of both methods is equivalent, because the absolute accuracy is similar. NNSS may even have advantages because single point accuracy with precise ephemeris exceeds the current accuracy of GPS P-code results. The GPS, however, has the advantage of a much shorter observation time needed.

F-53383

Hinze, H., **NNSS and GPS monitor very slow ice motion,** International Geodetic Symposium on Satellite Positioning, 4th, Apr. 28-May 2, 1986, Austin, Texas. Proceedings, 1986, p.1377-1390, Reprint of Conference Paper S9-10. 10 refs.

NNSS and GSP are used to determine the surface motion of ice with velocities of a few dm/day from data of one field season in simultaneous observation modes. Ice motion of NNSS stations was determined with the modified geodetic GEODOPV software. Doppler satellite passes in the translocation mode with one stationary receiver and one receiver on the ice surface are divided into data groups. The variations of relative coordinates are fitted for the linear station motion estimation. Solutions are presented for data of an antarctic piedmont glacier. At Anvers I. glacier velocities of a few dm/day have been determined during one field season. The results are confirmed by the annual displacement vectors. Permanent GPS satellite availability will enable rapid positioning and ice motion determination.

F-53393

Sukhorukov, K.K., **Internal stresses at typical local inhomogeneities of sea ice cover,** International Conference on Port and Ocean Engineering under Arctic Conditions, 13th, Murmansk, Russia, Aug. 15-18, 1995. Proceedings. POAC 95. Vol.2, St. Petersburg, 1995, p.128-137, 7 refs.

On the basis of representative full-scale studies performed under different conditions of the Arctic and the Antarctic (drift station Weddell-1, 1992), the structure of normal internal stresses at typical inhomogeneities of ice cover (relief inhomogeneities, disturbance of isostatic equilibrium, temperature differences) was identified. (Auth. mod.)

F-53432

Darby, M.S., Wilmott, A.J., Somerville, T.A., **On the influence of coastline orientation on the steady state width of a latent heat polynya,** *Journal of geophysical research,* July 15, 1995, 100(C7), p.13,625-13,633, 11 refs.

This paper investigates under what conditions the steady state shape of a coastal latent heat polynya is influenced by (1) the direction of flow of free-drifting frazil ice and the consolidated offshore ice sheet and (2) coastline orientation. Analytical solutions are obtained for coastal polynyas when the coastline is straight and when it has a single step. It is shown that the asymptotic polynya width is given by the generalized Pease (1987) width, L cos θ, where L is the "classical Pease width" and θ is the angle between the consolidated ice sheet velocity and the normal to the coastline. An expression is also obtained for the alongshore length scale L_C, over which the polynya adjusts toward its asymptotic width. It is shown that L_C depends upon the directions of travel of the frazil ice and the consolidated ice sheet. When the frazil ice and the consolidated ice sheet both drift offshore normal to the coast, $L_C=0$, in agreement with the classical Pease theory. Variations in the coastline which occur on a length scale much smaller than L_C are not reproduced in the polynya shape. (Auth. mod.)

F-53439

Sodhi, D.S., Rand, J.H., Tobiasson, W., **Stress analysis of a proposed tunnel under the South Pole skiway,** International Design for Extreme Environment Assembly, 2nd, Montreal, Oct. 24-27, 1993. Growth and Environment: challenging extreme frontiers; IDEEA Two conference proceedings, Montreal, Canada, 1994, p.57-66, 8 refs.

Unlined tunnels in the snow at the Amundsen-Scott Station will be used for safe movement of personnel to satellite science buildings during the austral winter. The first 1.8 m wide x 3 m high tunnel will pass under the existing skiway. This study determined the depth at which that tunnel should be located so that it is safe when aircraft pass over it. Three efforts were undertaken: (a) conducting a three-dimensional, elastic stress analysis of the snow around the tunnel, (b) comparing the maximum tensile and shear stresses from that analysis with corresponding strengths published in the literature, and (c) performing two experiments at South Pole to determine the surface pressure required to fail the snow around model tunnels. The authors found general agreement of theoretical and experimental results and recommended that the roof of the tunnel be located at least 6.1 m below the surface of the skiway. (Auth.)

F-53459

Monitoring of a drifting giant iceberg in the South Atlantic, *World Meteorological Organization. WMO Bulletin,* Jan. 1992, 41(1), p.80-82.

Until 1986 this iceberg was part of the Filchner Barrier in the far southern Weddell Sea; in Aug 1988 a NOAA satellite image showed the berg to consist of three large ice islands. In Feb 1990, the easternmost of these islands broke away as a tabular berg and began moving on a northwesterly track with the currents. As it moved toward the Antarctic Peninsula its course took on a more northerly heading and by Oct 10, 1991 it had passed between Clarence Island and the South Orkneys, reaching a position at about 59S 52W, moving northward at approximately 5 kph.

F-53471

Bintanja, R., **Local surface energy balance of the Ecology Glacier, King George Island, Antarctica: measurements and modelling,** *Antarctic science,* Sep. 1995, 7(3), p.315-325, 24 refs.

Meteorological measurements performed during the austral summer of 1990-91 are used to evaluate the surface energy balance and ablation at an elevation of 100 m asl on the Ecology Glacier, which is an outlet glacier of the main ice cap of King George I. Strong, gusty westerly winds prevail, although occasional southeasterly winds from the Weddell Sea reach the island. Generally, the climate can be characterized as relatively warm and humid with mean summer temperatures well above 0°C. As a result, considerable ablation (0.75 m water equivalent per month) takes place in the lower parts of the glacier. In spite of the large amount of cloud (0.83), solar radiation provided most of the energy used for melting (70.3 W/m^2). The longwave radiation, sensible heat flux and latent heat flux contributed -9.5, 27.4 and 7.4 W/m^2 respectively. Calculations show that a temperature rise of 1°C increases the ablation by almost 15%. (Auth. mod.)

F-53476

International Geoscience and Remote Sensing Symposium, Firenze (Florence), Italy, July 10-14, 1995, **IGARSS'95. Quantitative remote sensing for science and applications,** New York, Institute of Electrical and Electronics Engineers, 1995, 2331p. (3 vols.), Refs. passim. For selected papers see 49-6503 through 49-6578 or F-53477, F-53478, F-53480 through F-53484 and I-53479.

This is a collection of papers presented at the International Geoscience and Remote Sensing Symposium held in Florence, Italy, July 10-14, 1995. Eight papers are pertinent to Antarctica and deal with the following: comparison of seasonal sea ice model results with satellite microwave data; comparison of variations in seasonal sea ice formation with bottom water outflow data; atmospheric composition measurements; time series data analyses for climate change detection; azimuthal modulation of the microwave signature over antarctic sea and glacial ice; sea ice motion analysis; retrieval of temperature profiles over sea ice; and characterization of antarctic firn.

F-53477

Drinkwater, M.R., Fischer, H., Kreyscher, M., Harder, M., **Comparison of seasonal sea-ice model results with satellite microwave data in the Weddell Sea,** International Geoscience and Remote Sensing Symposium, Firenze (Florence), Italy, July 10-14, 1995. IGARSS'95. Quantitative remote sensing for science and applications. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1995, p.357-359, 9 refs.

Sea-ice simulations are generated with a dynamic-thermodynamic coupled ice-ocean model in the Weddell Sea for a period in 1992. The model output is compared with detailed measurements made at a drifting ice camp, and with ice kinematics measurements made by ERS-1. Results indicate that the model reproduces Eulerian drift velocity at ISW-1 relatively well during the early drift period, provided rheological parameters are scaled correctly. Deviations of velocity components from observed values along a Lagrangian drift trajectory also require parameter adjustments to achieve correspondence. (Auth.)

F-53478

Drinkwater, M.R., Long, D.G., Early, D.S., **Comparison of variations in sea-ice formation in the Weddell Sea with seasonal bottom-water outflow data,** International Geoscience and Remote Sensing Symposium, Firenze (Florence), Italy, July 10-14, 1995. IGARSS'95. Quantitative remote sensing for science and applications. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1995, p.402-404, 7 refs.

Seasonal and interannual variability of antarctic sea ice formation were observed using ERS-1 satellite microwave radar in the Weddell Sea. Time series from 6 antarctic regions with recurring ice-shelf polynya systems indicate relationships between the timing of seasonal peaks in measured bottom water outflow and ice formation rates. Results provide evidence about the critical periods of high surface heat fluxes and clues to primary brine production locations. (Auth.)

F-53480

Johannessen, O.M., Miles, M.W., Bjørgo, E., **Time series analysis of SMMR and SSM/I data for climate change detection,** International Geoscience and Remote Sensing Symposium, Firenze (Florence), Italy, July 10-14, 1995. IGARSS'95. Quantitative remote sensing for science and applications. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1995, p.625-626.

Sea ice is a sensitive component of the climate system, hence reductions in arctic and antarctic sea ice covers could be indicative of greenhouse warming. The most consistent source of information on sea ice parameters is microwave remote sensing from polar-orbiting satellites. Previous analyses of Scanning Multichannel Microwave Radiometer (SSMR) data from 1978-87 revealed a significant decrease in arctic sea ice extent with no changes in the Antarctic. Here, the authors extend the record to 1994 by including data from the subsequent Special Sensor Microwave Imager (SSM/I). This involves intercalibrating the SMMR-SSM/I data during their six-week overlap period, achieved at the sea ice concentration level using the NORSEX algorithm. Analysis of the merged 1978-94 continuous sea ice time series reveals continued decreases in arctic ice extent and area. A slight decrease in antarctic ice extent during the period was found. (Auth. mod.)

F-53481

Early, D.S., Long, D.G., **Exploration of C-band σ° dependence on azimuth angle over antarctic sea and glacial ice,** International Geoscience and Remote Sensing Symposium, Firenze (Florence), Italy, July 10-14, 1995. IGARSS'95. Quantitative remote sensing for science and applications. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1995, p.638-640, 3 refs.

In previous studies, the radar backscatter measurements from polar glacial ice have demonstrated modulation in azimuth angle. Azimuthal modulation is a function of the wind-induced surface characteristics of the glacial ice. In a continuing evaluation of the ERS-1 C-band scatterometer as a tool for studying polar sea ice, the authors evaluate the azimuthal modulation characteristics of antarctic sea ice. By using several study regions dispersed in the antarctic seasonal sea ice pack, the scatterometer data is evaluated for evidence of azimuthal modulation. The incidence angle dependence is estimated and removed in each study region before determining whether azimuthal modulation is present in the data. Results show that there is negligible azimuthal modulation at the scale of observation of the ERS-1 C-band scatterometer. (Auth.)

F-53482

Rebhan, H., Li, A.N., **Ice motion analysis on different spatial scales in the Weddell Sea,** International Geoscience and Remote Sensing Symposium, Firenze (Florence), Italy, July 10-14, 1995. IGARSS'95. Quantitative remote sensing for science and applications. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1995, p.641-643, 5 refs.

Ice motion vector fields derived from satellite images are analyzed for one region in the central part of the Weddell Sea. By taking overlapping ERS-1 SAR and NOAA-AVHRR data the analysis could be made for approximately the same time period. Whereas mean values for velocity and direction are consistent for each sensor, the shear of the ice pack is much higher for the AVHRR frames. Short time variations due to changing surface wind conditions are clearly visible in the AVHRR data. (Auth.)

F-53484

Rott, H., Rack, W., **Characterization of antarctic firn by means of ERS-1 scatterometer measurements,** International Geoscience and Remote Sensing Symposium, Firenze (Florence), Italy, July 10-14, 1995. IGARSS'95. Quantitative remote sensing for science and applications. Vol.3, New York, Institute of Electrical and Electronics Engineers, 1995, p.2041-2043, 8 refs.

Mean intensities, angular dependence and azimuthal anisotropy of backscattering were analyzed over Antarctica based on scatterometer measurements from ERS-1. The backscattering parameters enable discrimination of various types of snow and ice due to differences in morphology which are the result of accumulation rate, temperature, and wind activity. Azimuthal anisotropy is strongly pronounced in katabatic wind zones and can be related to dominant wind direction. (Auth. mod.)

F-53485

International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994, Rothrock, D.A., ed, **Proceedings,** *Annals of glaciology,* 1995, Vol.21, 421p., Refs. passim. For individual papers see 49-6580 through 49-6642 or F-53488 through F-53502, I-53486 and I-53487.

This is a collection of papers presented at the International Symposium on the Role of the Cryosphere in Global Change, held in Columbus, OH, Aug. 7-12, 1994. The antarctic research reported deals with climate models and atmospheric analyses, precipitation, snow and ice accumulation rates, ice dating, ice sheet and ground heat flux, climate sensitivity of blue ice areas, subsurface melting, glacier velocities, glaciological maps, sea ice and paleoclimatology. A program of sessions and an author index are included.

F-53488

Zwally, H.J., Giovinetto, M.B., **Accumulation in Antarctica and Greenland derived from passive-microwave data: a comparison with contoured compilations,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.123-130, 33 refs.

The annual rate of net mass accumulation at the surface in the Antarctic and Greenland ice sheets is determined from firn emissivity based on Nimbus-5 ESMR and Nimbus-7 THIR data. In this study the determinations are limited to the areas of dry-snow facies and are based on a hyperbolic function of emissivity. Two coefficients of the function are selected for particular regions of each ice sheet after a comparison with field data selected for their reliability (82 stations in East Antarctica, 69 stations in West Antarctica and 89 stations in Greenland). Derived accumulation values are produced for grid-point locations 100 km apart. These values are compared with interpolated values obtained from the latest contoured compilations of field data. The means of derived values for East and West Antarctica are 12% and 39% larger, respectively, than the mean obtained from interpolated values, suggesting that the isopleth patterns as drawn in the compilation of field data lead to underestimates. (Auth. mod.)

F-53489

Mosley-Thompson, E., et al, **Recent increase in South Pole snow accumulation,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.131-138, 26 refs.

This paper summarizes the 37 year history of net accumulation measurements at the geographic South Pole obtained by numerous investigators using a variety of techniques. These data led to the conclusion that annual net snow accumulation has increased in the vicinity of Amundsen-Scott Station since 1955. The records were examined for evidence of a "station effect" but it is concluded that not all of the observed increase can be attributed to snow drift associated with the presence of the station. Furthermore, the accumulation increase at South Pole appears consistent with increases observed at other locations on the East Antarctic Plateau, and in the Peninsula region as well. These data suggest that the recent accumulation increase at Amundsen-Scott Station may be regionally extensive over the East Antarctic Plateau. (Auth.)

F-53490

Van Roijen, J.J., Van der Borg, K., De Jong, A.F.M., **Ages and ablation and accumulation rates from ^{14}C measurements on antarctic ice,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.139-143, 14 refs.

Shallow ice cores from an antarctic blue-ice area at Scharffenbergbotnen were ^{14}C-analyzed using a dry-extraction technique and accelerator mass spectrometry. The in-situ production was determined from the ^{14}CO component and used to deduce the natural $^{14}CO_2$ component. The ages were measured at 10,000±3000 bp. The accumulation and ablation rates determined from the in-situ production are 7-20 and 10 cm/a, respectively, showing agreement with field observations. The derived ages and air-yield data show a nearby origin for the surface ice. (Auth.)

F-53491

Paltridge, G.W., Zweck, C.M., **Climate, the antarctic ice sheet and ground heat flux,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.144-148, 12 refs.

A simple steady-state energy and mass-balance model of the antarctic ice sheet is developed. Basically it is a set of two equations with two unknowns of steady-state height *h* and potential basal temperature T_b. T_b determines whether, and to what extent, there is liquid water at the base of the ice, which in turn affects the values of *h* and T_b. Simultaneous changes of sea-level temperature and precipitation changes related to each other, as might be expected from global climate models, indicate a maximum in the field of possible steady-state ice volumes which may not be far from the presently observed conditions. The possibility of cyclical variation in ground heat flux associated with convection of water and heat in the continental crust is discussed. The mechanism might be capable of generating cycles of ice-sheet volume with relatively short periods similar to those of Milankovitch forcing. (Auth.)

F-53493

Bintanja, R., Van den Broeke, M.R., **Climate sensitivity of antarctic blue-ice areas,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.157-161, 8 refs.

On time-scales of less than ca. 100 years, when the ice topography can be considered stationary, the extent of antarctic blue-ice areas is governed mainly by the surface mass balance. In and near high-elevation blue-ice areas, ablation is due entirely to sublimation. An estimate of the mass-balance profile ranging from a blue-ice area to the adjacent snow surface is presented. By considering changes in sublimation induced by variations in local climate, the deviation from the mass-balance profile is evaluated. It is concluded that even for considerable changes in local climate these deviations remain relatively small and have only little effect on the extent of a blue-ice area. This can be attributed mainly to the steep mass-balance profile. (Auth.)

F-53494

Bøggild, C.E., Winther, J.G., Sand, K., Elvehøy, H., **Sub-surface melting in blue-ice fields in Dronning Maud Land, Antarctica: observations and modelling,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.162-168, 17 refs.

During the Norwegian Antarctic Research Expedition 1993-94, field studies were conducted on a blue-ice field in Jutulgryta, Queen Maud Land. Measurements of subsurface temperatures revealed that temperatures in blue ice were about 6°C higher than in the adjacent snow. Despite the predominantly negative air temperatures, a subsurface melt layer was discovered within the uppermost meter of the blue ice. Here the temperature maximum was consistent throughout the entire month of observations, and resulted in both internal melt and water transport. The melting is a consequence of solar radiative penetration and absorption within the ice, i.e. the "solid-state greenhouse". Sensitivity experiments using a non-stationary combined radiative and thermodynamic model reveal that the physical properties (here extinction coefficient, radiation transmittance and albedo) strongly control the formation and vertical extent of the melt layer. The persistence of the subsurface melt layer increases the runoff volume from blue-ice fields, which otherwise might be restricted to a few yearly events when air temperatures reach or exceed the freezing point. (Auth. mod.)

F-53495

Pasteur, E.C., Mulvaney, R., Peel, D.A., Saltzman, E.S., Whung, P.Y., **340 year record of biogenic sulphur from the Weddell Sea area, Antarctica,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.169-174, 26 refs.

Detailed records of methanesulphonic acid (MSA) and non-sea-salt sulphate (nss SO_4^{2}) have been obtained from ice cores drilled on Dolleman I. Annual average concentrations of MSA are presented for the period 1652-1992. Over this time span, the mean annual concentration of MSA is 0.69 μeq/l, the range is 0.13-2.35 μeq/l, and the MSA/nss-SO_4^{2-} ratio is 0.22. The high MSA concentration reflects the proximity of the Weddell Sea, believed to be a region of high marine phytoplankton production. The overall mean nss-SO_4^{2-} concentration is about 66% of the total sulphate deposited in the snowfall. Low-frequency variations of MSA and oxygen-isotope signals correlate closely, indicating that they may be modulated by similar atmospheric processes. Positive correlations are observed between the oxygen-isotope signature and both MSA and nss SO_4^{2-}, significant at the 99% level. A small negative correlation can be seen between both species and the annual duration of sea ice at Scotia Bay, Laurie I., since 1902. (Auth. mod.)

F-53496

Dai, J.C., Thompson, L.G., Mosley-Thompson, E., **485 year record of atmospheric chloride, nitrate and sulfate: results of chemical analysis of ice cores from Dyer Plateau, Antarctic Peninsula,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.182-188, 12 refs.

Detailed ionic analyses of Dyer Plateau snow show that major soluble impurities in snow include sodium (Na^+), chloride (Cl^-), nitrate (NO_3^-), sulfate (SO_4^{2-}), and acidity (H^+). The ratios of Na^+ to Cl^- concentrations are close to that of sea water, indicating little or no fractionation of sea-salt aerosols. The analyses of core sections from three sites along a 10 km transect show that local spatial variation of snow chemistry in this area is minimal and that temporal (decadal, inter-annual and sub-annual) variations in snow chemistry are very well preserved. Anion analyses of the upper 181 m section of two 235 m ice cores yield a data set of 485 years (1505-1989) of annual snow accumulation and fluxes of Cl^-, NO_3^- and non-sea-salt (nss) SO_4^{2-}. No significant long-term trends are evident in any of the anion fluxes. This is consistent with other antarctic ice-core records showing no significant anthropogenic atmospheric pollution in the high southern latitudes. (Auth. mod.)

F-53497

Lucchitta, B.K., Rosanova, C.E., Mullins, K.F., **Velocities of Pine Island Glacier, West Antarctica, from ERS-1 SAR images,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.277-283, 19 refs.

Pine Island Glacier is one of the major ice streams draining West Antarctica. The authors calculated average velocities for both its grounded and floating parts by tracking crevasses and other patterns moving with the ice on two sequential images acquired in Feb. and Dec. 1992 by ERS-1 SAR. Velocities in the fast-moving central parts of the glacier range from ca. 1.3 km/a on the grounded part to ca. 2.6 km/a on the floating part. Velocity increases rapidly just below the grounding line. For the floating part, velocities are approximately 0.3 km/a faster than previously established from Landsat images by other workers. This observation suggests that the discharge is larger, and therefore the mass balance less positive than previously thought; however, the study also shows that current information is insufficient to allow for precise mass-balance calculations. Images of the glacier front show that a calving event released an iceberg about 5 km wide between Feb. and Dec., 1992. The position of the glacier front has not changed substantially between 1973 (Landsat image) and 1992 (ERS-1 images). (Auth.)

F-53498

Williams, R.S., Jr., Ferrigno, J.G., Swithinbank, C., Lucchitta, B.K., Seekins, B.A., **Coastal-change and glaciological maps of Antarctica,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.284-290, 25 refs.

In 1990 the U.S. Geological Survey in cooperation with the Scott Polar Research Institute began a long-term coastal mapping project in Antarctica that is based on analysis of Landsat images and ancillary sources. Analysis of images used in producing the first five of 24 maps has shown that ice fronts, iceberg tongues and glacier tongues are the most dynamic and changeable features in the coastal regions of Antarctica. Seaward of the grounding line of outlet glaciers, ice streams and ice shelves, the floating margin is subject to frequent large calving events and rapid flow. Although calving does occur along ice walls, the magnitude of their change on an annual to decadal basis is generally not discernible from Landsat images; therefore, ice walls can be used as relatively stable reference features for measuring other changes along the coast. Velocities of outlet glaciers, ice streams and ice shelves range from 0.1 to several km/y. (Auth. mod.)

F-53499

Skvarca, P., Rott, H., Nagler, T., **Satellite imagery, a base line for glacier variation study on James Ross Island, Antarctica,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.291-296, 13 refs.

Sequential visible and radar satellite imagery are used to document the fluctuations of 39 outlet glaciers on James Ross I. (JRI). The monitoring time interval of 17.4 years extends from late 1975 to early 1993. The study is based on synergistic use of different sensors for monitoring glacier variations. The digitally enhanced Landsat TM images also allowed definition of boundaries between grounded and floating ice within Röhss Bay and detection of ice rumples, resulting in an improved measurement of the areal extent of JRI. The satellite data show a general glacier retreat since 1975, resulting in clear decrease of overall glacier area on JRI. Of 39 glaciers measured, 33 retreated in the period 1975-93, 15 of which showed significant retreat in comparison to glacier size. This is in accordance with the pronounced atmospheric-warming trend recorded during the last two decades on the Antarctic Peninsula. The analysis of glacier areas on JRI thus provides a base line for detection of future changes. (Auth.)

F-53500

Parkinson, C.L., **Recent sea-ice advances in Baffin Bay/Davis Strait and retreats in the Bellingshausen Sea,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.348-352, 7 refs.

Experience over the past two decades with the continually lengthening satellite record has frequently revealed prominent increases or decreases in regional or even hemispheric sea-ice coverage which last for a several-year period and are then reversed. Also, in almost any multi-year period in the short satellite record available, at least one region could be highlighted as having prominent ice-cover increases and at least one as having prominent ice-cover decreases. In the 1988-91 period of low ice coverage in the Bellingshausen Sea, mid-winter sea-ice extents noticeably increased in the Baffin Bay/Davis Strait region. Placed in the longer temporal context of ice extents since the late 1970s, the ice-extent increases from 1988 to 1991 in Baffin Bay/Davis Strait conform much better to an interpretation of cyclically varying wintertime ice extents than with one of a long-term upward trend. The time series for the Bellingshausen Sea also shows marked multi-year fluctuations and, although in the 1989-91 period the summertime coverage was unusually low, the wintertime ice coverage noticeably increased. (Auth. mod.)

F-53501

Bintanja, R., Oerlemans, J., **Influence of the albedo-temperature feed-back on climate sensitivity,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.353-360, 24 refs.

A vertically integrated, zonally averaged energy-balance climate model coupled to a two-dimensional ocean model with prescribed overturning pattern is employed to assess the seasonally and latitudinally varying response of the climate system to changes in radiative forcing. Since the sensitivity of the climate system depends on its actual state, considerable attention is given to the correct simulation of the important features of the present-day climate (such as surface ice temperature, sea-ice and snow amount and meridional energy transport). The climate variability induced by the various elements of the albedo-temperature (e.g. sea-ice and snow) feedback is quantified. It appears that the variability caused by sea-ice variations is approximately twice as large as for snow variations. (Auth.)

F-53502

Eicken, H., Fischer, H., Lemke, P., **Effects of the snow cover on antarctic sea ice and potential modulation of its response to**

climate change, *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.369-376, 22 refs.

Based on field data, it is shown that snow contributes roughly 8% to the total mass of ice in the Weddell Sea. Snow depth averages 0.16 m on first-year ice (average thickness 0.75 m) and 0.53 m on second-year ice (average thickness 1.70 m). Due to snow loading, sea ice is depressed below water level and flooded by sea water. As a result of flooding, snow ice forms through congelation of sea water and brine in a matrix of meteoric ice. Sea-ice growth has been simulated with a one-dimensional model, treating the evolution of salinity, porosity and thermal properties of the ice. Simulations demonstrate that in the presence of a snow cover, ice growth is significantly reduced. Brine volumes increase by a factor of 1.5-2, affecting properties such as ice strength. Snow-ice formation depends on the evolution of freeboard and ice permeability. Effects of accumulation-rate changes have been assessed for the Weddell Sea with a large-scale sea-ice model accounting for snow-ice formation. (Auth. mod.)

F-53503

Delmas, R.J., ed, **Ice core studies of global biogeochemical cycles,** North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I: Global environmental change, Vol.30, Berlin, Springer-Verlag, 1995, 475p., Refs. passim. Proceedings of a NATO Advanced Research Workshop, Annecy, France, Mar. 26-31, 1993. For selected papers see 49-6644 through 49-6662 or F-53506, F-53508 through F-53512, I-53504, I-53505 and I-53507.

This volume contains manuscripts of scientific presentations of the Annecy NATO ARW, held in Annecy, France on Mar. 26 to 31, 1993. The main topics addressed concern polar aerosol studies by chemists and glaciologists, to determine the aerosol composition, source, transport and nature. The focus is on the pollution of atmosphere, ocean, and ice and snow, and the relation between climate and atmospheric mobilization and depositional processes established through studies of ancient ice and recent snow from the Antarctic.

F-53506

Legrand, M., **Sulphur-derived species in polar ice: a review,** Ice core studies of global biogeochemical cycles. North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I, Vol.30. Edited by R.J. Delmas, Berlin, Springer-Verlag, 1995, p.91-119, Refs. p.116-119.

Sulphate trapped in polar ice is associated with several chemical compounds including sea salt, Na_2SO_4, $CaSO_4$, NH_4HSO_4, $(NH_4)_2SO_4$, and H_2SO_4 which are present in varying proportions depending on the location and on the considered time period. While sulphuric acid dominates the sulphate budget of ice of present-day climatic conditions, the contribution of sulphate associated with sea salt and soil dust increased in ice deposited during past colder climate. NH_4HSO_4, the concentration of which is insignificant in antarctic ice, is believed to be present in significant amounts in Greenland ice. Numerous studies have demonstrated that sulphate concentrations of Greenland and antarctic ice increased often, but for short-time periods (a few months to two years), after large volcanic eruptions. Ice-core data also suggest that the non-volcanic natural sulphate background level is mainly marine and biogenic (DMS emissions) in origin in Antarctica under present climatic conditions as well as during the last two ice ages. It is also suggested that the rate of these DMS emissions has changed in the past in response to short and long-term climatic variations. (Auth. mod.)

F-53508

Wolff, E.W., **Nitrate in polar ice,** Ice core studies of global biogeochemical cycles. North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I, Vol.30. Edited by R.J. Delmas, Berlin, Springer-Verlag, 1995, p.195-224, Refs. p.220-224.

Nitrate is one of the major impurities in polar snow, and is relatively easy to analyze. Large amounts of data therefore exist, including some from cores extending into the last glaciation. However, the data are not easy to interpret, and the authors do not yet have an adequate knowledge of even the present-day sources of nitrate to polar snow, nor of the deposition processes that control the concentration seen. It is clear that anthropogenic pollution has increased the concentrations in Greenland snow by a factor of two in recent decades, while no similar increase is seen in Antarctica. In pre-industrial Greenland ice, a clear seasonality allows annual layer counting. The sources in pre-industrial ice are probably lightning and/or the stratosphere, while soil exhalation may be an additional major component in Greenland. Whereas nitrate in Holocene ice is present as nitric acid, in ice from the last glaciation it is present as neutral salt, associated with terrestrial cations. (Auth.)

F-53509

Bales, R.C., **Nitric acid in firn: discussion,** Ice core studies of global biogeochemical cycles. North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I, Vol.30. Edited by R.J. Delmas, Berlin, Springer-Verlag, 1995, p.241-245, 10 refs.

Post-depositional changes in the HNO_3 content of polar snow and firn limit the ability to infer past atmospheric concentrations and changes in concentration from an analysis of NO_3^- in polar ice cores. Nitrate is present in snow, firn and polar ice both as HNO_3 and as nitrate salts, and is a widely measured parameter in ice cores. Wolff (this book) presents a thorough review of reported nitrate data, and summarizes what has been inferred about nitrate sources. Because nitrate concentrations in near-surface snow can apparently decrease after deposition, presumably by re-emission to the atmosphere, Wolff largely confines his review to ice and firn that are buried and not in close contact with the atmosphere. There are several reports of apparent HNO_3 loss from near-surface snow, though a quantitative understanding of the loss processes has yet to emerge. (Auth. mod.)

F-53510

Neftel, A., Bales, R.C., Jacob, D.J., **H_2O_2 and HCHO in polar snow and their relation to atmospheric chemistry,** Ice core studies of global biogeochemical cycles. North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I, Vol.30. Edited by R.J. Delmas, Berlin, Springer-Verlag, 1995, p.249-264, 36 refs.

The ability to infer past atmospheric concentrations of hydrogen peroxide (H_2O_2) and formaldehyde (HCHO) from concentrations measured in polar firn and ice cores is limited by the lack of understanding of the atmosphere-snow transfer functions for the two species. Continuous H_2O_2 records going back into the last century have been obtained from Dye 3 and Summit in central Greenland and Siple Station, Antarctica, with some measurements preserved back into the last glaciation. HCHO records also extend back into the last glaciation in these same cores. Surface-snow and pit studies clearly show that H_2O_2 and HCHO concentrations in snow change in the days to weeks after the snow is deposited. It is thought that buried layers reflect seasonal average values, mediated by the amount and seasonal pattern of water accumulation and the temperature. Development of process models of phase exchange in the snow and firn is essential for interpreting the ice core records of H_2O_2 and HCHO in terms of trends in the oxidizing power of the atmosphere. (Auth. mod.)

F-53511

De Angelis, M., Legrand, M., **Preliminary investigations of post depositional effects on HCl, HNO_3, and organic acids in polar firn layers,** Ice core studies of global biogeochemical cycles. North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I, Vol.30. Edited by R.J. Delmas, Berlin, Springer-Verlag, 1995, p.361-381, 24 refs.

Concentration changes occurring for HNO_3, HCl and several organic acids in snow recently deposited over central polar areas have been investigated. These changes, referred to as "post depositional effects", were studied for time periods varying from one month in Greenland to several decades in Antarctica. In Antarctica, HCl and HNO_3 seem to progressively escape from snow in sites where snow accumulation rates are very low (i.e. lower than 6 to 8 cm H_2O/yr). This phenomenon takes place within the upper meter of firn for HNO_3 and between 8-10 m depth and the surface for HCl. In central Greenland, HCl and HNO_3 content of snow sampled within a few days or a few weeks after the precipitation are significantly higher than concentrations measured in aged firn layers (more than one year old). Over and above the effect of smoothing due to diffusion processes, a portion of these two species may escape from firn layers, as proposed for Antarctica. However, a direct comparison between Antarctica and Greenland cannot be made because the meteorological conditions prevailing over the two polar ice caps are drastically different. (Auth.)

F-53512

Vandal, G.M., Fitzgerald, W.F., Boutron, C.F., Candelone, J.P., **Mercury in ancient ice and recent snow from the Antarctic,** Ice core studies of global biogeochemical cycles. North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I, Vol.30. Edited by R.J. Delmas, Berlin, Springer-Verlag, 1995, p.401-415, 47 refs.

This study demonstrates the predominance of oceanically derived Hg as the source of natural Hg to the Antarctic, a region remote from continental sources, during preindustrial times. Limited studies of oceanic Hg evasion, primarily in the Equatorial Pacific Ocean, show a relationship between Hg° evasion and chlorophyll-*a*. Investigations also suggest that oceanic evasion is a major source of Hg to the atmosphere. It is concluded that temporal variations of Hg in ice cores may prove to be useful indicators of paleoproductivity and oceanic emissions of reduced sulfur gases. Human-related changes in Hg deposition to Antarctica should be addressed from a continuous core that can provide a history over the past two centuries. Studies of seasonal variations in snow Hg concentrations in conjunction with nss SO_4 and MSA measurements would help elucidate the importance of the oceanic Hg° source to the antarctic continent.

F-53590

Nazarov, V.D., **Effect of temperature and density on snow cover stability of the runway at Molodezhnaya Station** [Vliianie temperatury i plotnosti na prochnost' snezhnogo pokrytiia aerodroma AMTS Molodezhnaya], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1992, Vol.88, p.68-73, In Russian. 3 refs.

A link between stability and density of artificially compacted snow, not subjected to melting, was determined at temperatures close to 0°C. It is concluded that, at snow cover densities >550 kg/cu m, the runway at Molodezhnaya Station can be used by Il-76TD aircraft even at snow temperatures close to 0°C.

F-53591

Nazarov, V.D., **Some characteristics of the temperature regime of the artificially compacted snow layer on the runway at Molodezhnaya Station** [Nekotorye osobennosti temperaturnogo rezhima iskusstvenno uplotnennoĭ snezhnoĭ tolshchi aerodroma AMTS Molodezhnaia], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1992, Vol.88, p.74-81, In Russian. 2 refs.

Investigations carried out in naturally layered and artificially compacted snow in Gora Vechernaya showed a relationship between the snow temperature, thickness, and the seasonal atmospheric temperature variations.

F-53594

Nazarov, V.D., **Spring and summer radiation regime in artifically compacted snow.** [Osobennosti radiatsionnogo rezhima iskusstvenno uplotnennogo snega v vesenne-letniĭ period], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1992, Vol.88, p.110-120, In Russian. 20 refs.

The main features of the penetration, absorption and scattering of solar radiation in artificially compacted snow cover on the Molodezhnaya runway and in naturally layered snow cover are compared.

F-53595

Nazarov, V.D., **Artificially compacted snow and temperature regime in a glacier active layer** [Vliianie iskusstvennogo uplotneniia snega na temperaturnyĭ rezhim aktivnogo sloia lednika], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1992, Vol.88, p.121-124, In Russian. 2 refs.

Temperature variations in a glacier active layer, and their relation to several-years-standing artificially compacted snow over the runway at Molodezhnaya Station, are discussed. The snow cover is found to have a marked effect on the temperature regime of the underlying firn layer, increasing the thickness of the active layer and decreasing its temperature.

F-53596

Gohin, F., **Some active and passive microwave signatures of antarctic sea ice from mid-winter to spring 1991,** *International journal of remote sensing,* July 20, 1995, 16(11), p.2031-2054, 24 refs.

This paper compares dry-snow extinction coefficients derived from satellite radar altimeter data with brightness temperature data from passive microwave measurements over a portion of the East Antarctic plateau. A comparison between extinction coefficients and brightness temperatures shows a strong negative correlation, where the correlation coefficients ranged from -0.87 to -0.95. The large-scale trend shows that the extinction coefficient of dry polar snow decreases with increasing surface elevation, while the average brightness temperature increases with surface elevation. The analysis shows that the observed trends are related to geographical variations in scattering coefficient of snow, which in turn are controlled by variations in surface temperature and snow accumulation rate. By combining information present in the extinction coefficient and brightness temperature datasets, a simple semi-empirical model that can be used to obtain accumulation rate estimates of dry polar snow is developed. (Auth. mod.)

F-53597

Davis, C.H., **Synthesis of passive microwave and radar altimeter data for estimating accumulation rates of dry polar snow,** *International journal of remote sensing,* July 20, 1995, 16(11), p.2055-2067, 41 refs.

Antarctic sea ice is often covered by a deep snow layer which acts as an emitter and a scatterer to microwave radiation leading to possible misinterpretations of ice signatures, particularly at high frequencies. The algorithms for ice identification, based on the observations of the Special Sensor Microwave Imager, at 19 GHz and 37 GHz polarization, have proven to be inefficient for distinguishing new and old ice over the antarctic ocean. At an equivalent resolution and analyzed on a weekly basis, complementary information can be obtained from active microwave measurements provided at 5.3 GHz by the Active Microwave Instrument, the scatterometer of ERS-1. Based on data obtained from the end of Aug. to the end of Nov. 1991 during the austral winter and spring, radar backscatter is analyzed as a function of the incident angle. At low incident angles, the derivative of the backscatter is closely related to the water concentration as derived from passive radiometry, whereas at high incident angles, the backscatter is mainly due to ice, as the water contribution is strongly reduced. During the whole period, stable features are apparent on the images obtained from the backscattering coefficients at 50°. On those images, higher values characterize the marginal ice zone, the polynya areas and the advected ice within the Ross Sea. (Auth. mod.)

F-53604

Sukhorukov, K.K., **Structure of internal stresses in the uncompacted ice cover,** International Offshore and Polar Engineering Conference, 5th, Hague, Netherlands, June 11-16, 1995. Proceedings. Vol.2. Edited by J.S. Chung, M. Sayed, and A.M. Gresnigt, Golden, CO, International Society of Offshore and Polar Engineers (ISOPE), 1995, p.393-397, 9 refs.

Local internal stresses in ice floes after collisions with icebergs were measured by the joint Russian-U.S. Weddell-I ice drift station, Feb.-June 1992. It was found that the stresses extended 300, 350, and 400 ice thicknesses of the floe for ice concentrations of 0.9, 0.95, and 1.0, respectively.

F-53615

Heygster, G.C., Burns, B.A., Markus, T., Meyer-Lerbs, L., Sethmann, R., Tietze, R.P., **Improved use of passive microwave data for sea ice detection,** European "International Space Year" Conference, Munich, Germany, 30 March-4 April 1992. Vol.1. Remote sensing for global change, climate change and atmosphere & ocean forecasting, Paris, European Space Agency, 1992, p.145-150, 18 refs.

Signal and image processing applications improve sea ice detection with passive microwave imagery. Three deconvolution techniques, a Wiener filter and two entropy-based algorithms have been used to improve the horizontal resolution. A blind deconvolution algorithm determining two images given only their noisy convolution checks the antenna pattern for possible changes after launch. Sea ice concentrations derived from passive microwave imagery using different algorithms and from AVHRR images are projected onto a common grid and compared. Methods are described to merge AVHRR and SSM/I data sets to validate and improve ice concentration estimates for the Weddell Sea. The results of a method for detecting subpixel-scale polynyas, based on models for the brightness temperature transition from sea ice to antarctic shelf ice with and without polynya, are compared to AVHRR data and wind data. (Auth. mod.)

F-53619

Andreas, E.L., **Physically based model of the form drag associated with sastrugi,** *U.S. Army Cold Regions Research and Engineering Laboratory. Report,* July 1995, 12p., ADA-298 688, 31 refs.

On Ice Station Weddell, some characteristics of the neutral-stability air-ice drag coefficient at a reference height of 10 m (C_{DN10}) were observed that had not been documented before. The main finding was that wind-driven snow continually alters the sea ice surface; the resulting snowdrifts determine how large C_{DN10} is. In particular, this report describes three observations and attempts to explain them: 1) C_{DN10} is near $1.5x10^{-3}$ when the wind is well aligned with the drifted snow; 2) C_{DN10} is near $2.5x10^{-3}$ when the wind makes a large angle with the dominant orientation of the snowdrifts; 3) C_{DN10} can increase by 20% if, after being well aligned with the drift patterns, the mean wind direction shifts by as little as 20°. To investigate this behavior of C_{DN10}, this report adapts a model developed by Raupach that partitions the total surface stress into contributions from form drag and skin friction. With reasonable choices for free model parameters and with little fine-tuning, this physically based model can reproduce the three main observations. In other words, the model seems to include the basic physics of air-ice momentum exchange. This modeling implies that 10-cm high sastrugi-like roughness elements, rather than pressure ridges, sustain most of the form drag over compact sea ice in the western Weddell Sea. Lastly, the report speculates on what the observations and this model say about how to parameterize C_{DN10} over snow-covered sea ice. (Auth.).

F-53631

Japanese Society of Snow and Ice. Polar Snow and Ice Branch Committee (Nihon seppyo gakkai Kyokuchi seppyo bunkakai iinkai), **Antarctic snow and ice sciences glossary** [Nankyoku seppyogaku yogoshu], Sapporo, Japan, Hokkaido University, Institute of Low Temperature Science, 1982, 38p., Japanese equivalents and definitions of English terms with Japanese-English index. Refs. passim.

This glossary contains over 300 terms, particularly as applied to antarctic glaciological research, but also some general snow and sea ice terms. The terms are listed alphabetically in English with their Japanese equivalents and definitions. Selected terms cite the source where they were first defined. An index of Japanese terms with their English equivalents is included.

F-53637

Naval Polar Oceanography Center. Naval Ice Center, **Antarctic sea ice analysis, 1991-1992,** Washington, D.C., 1992, 107p., ADA-286 729.

Based on satellite data, a series of weekly maps of sea ice distribution from Jan. 7, 1991 to Dec. 31, 1992 is presented. No text or abstract accompany the maps.

F-53639

MacAyeal, D.R., Bindschadler, R.A., Scambos, T.A., **Basal friction of Ice Stream E, West Antarctica,** *Journal of glaciology,* 1995, 41(138), p.247-262, 26 refs.

Glacier surface velocity derived from sequential Landsat imagery and a control method are used to estimate the basal-friction distribution of Ice Stream E, a major West Antarctic ice stream. The area-averaged basal stress is approximately 1.4×10^4 Pa. Spatial variation associated with depth-averaged temperature variation gives an uncertainty of approximately $\pm 10^3$ Pa. Approximately 60% of the ice stream has a basal-stress magnitude less than 10^4 Pa, and approximately 30% has less than 10^3 Pa. These characteristics suggest the presence of a mechanically weak, water-charged subglacial till. Small-scale sticky spots where basal friction exceeds the area-averaged driving stress are scattered irregularly across the subglacial regime and comprise approximately 15% of the ice-stream area. Sticky spots cluster in regions where Landsat imagery suggests structural features in the underlying bedrock. (Auth. mod.)

F-53640

Van den Broeke, M.R., Bintanja, R., **Interaction of katabatic winds and the formation of blue-ice areas in East Antarctica,** *Journal of glaciology,* 1995, 41(138), p.395-407, 36 refs.

Blue-ice areas (BIAs) are an extreme example of a local mass-balance gradient and are furthermore reasonably stable in time and space owing to local feedback mechanisms. A meteorological experiment performed around a blue-ice area in Queen Maud Land showed that during drifting-snow conditions, surface wind speed over the blue ice behind the mountain barrier is equal to that away from the mountains, when corrected for surface roughness. A diagnostic model is tested for a two-dimensional profile in Adélie Coast after which it is applied to the entire East Antarctica. The present order-of-magnitude estimate shows that areas sensitive to blue-ice formation appear where precipitation is low and mean annual wind speed is high, e.g. in Queen Maud Land and the drainage basin of Lambert Glacier. The results appeared to be especially sensitive to change in inversion strength: a decrease in inversion strength weakens the katabatic flow, and thus the amount of snowdrift transport, reducing the area where BIAs can develop. (Auth. mod.)

F-53641

Ren, J.W., et al, **Glaciological studies on Nelson Island, South Shetland Islands, Antarctica,** *Journal of glaciology,* 1995, 41(138), p.408-412, 13 refs.

The ice cap on Nelson I. in the South Shetlands was studied between 1985 and 1989. Owing to intense percolation of meltwater, the snow firn layer is in the soaked facies, with a firn-ice transition at a depth of 25-26 m at the summit. A force-balance model suggests that the ice is almost linearly viscous but has a high viscosity. The model further suggests that basal sliding makes a larger contribution to the ice movement than does ice deformation. From 1970 to 1988, the average accumulation rate was 120 $kg/m^2/a$ at the center, and between 1985 and 1989 the equilibrium-line elevation averaged 110 m a.s.l. (Auth. mod.)

F-53642

Lipenkov, V.IA., Candaudap, F., Ravoire, J., Dulac, E., Raynaud, D., **New device for the measurement of air content in polar ice,** *Journal of glaciology,* 1995, 41(138), p.423-429, 19 refs.

A new device for measuring air content in polar ice has been designed, built and tested with 22 samples of antarctic ice. The new technique is based on the barometric method which implies: (1) air extraction under vacuum by melting-refreezing of the ice sample placed in a calibrated cell, and (2) accurate air-pressure and temperature measurements. The new apparatus simplifies the experimental procedure, decreases the duration of measurement and can eventually be used in the field. It provides results with an accuracy equivalent to or better than other methods previously used. (Auth.)

F-53643

Haas, C., Thomas, D.N., **Glacial-ice fragments in antarctic sea ice,** *Journal of glaciology,* 1995, 41(138), p.432-435, 15 refs.

The authors present a novel finding of glacial-ice fragments (up to several centimeters in diameter) in a sea-ice core obtained in the Bellingshausen Sea north of Alexander I. Glacial ice has not previously been described as an important component of sea ice, although in this core it amounted to 20% of the core volume. The features of the core, including texture, salinity and $\delta^{18}O$ measurements, are reported and the relevance of glacial ice fragments as a component of the sea ice in this region of the Antarctic is discussed. (Auth. mod.)

F-53659

Langway, C.C., Jr., Osada, K., Clausen, H.B., Hammer, C.U., Shoji, H., **10-century comparison of prominent bipolar volcanic events in ice cores,** *Journal of geophysical research,* Aug. 20, 1995, 100(D8), p.16,241-16,247, 38 refs.

Measurements of key chemical and physical parameters made along continuous long sections of polar ice cores can provide reliable past snow accumulation rates and other environmental records. The prime accumulation indicators include variations found in the stable isotopes, ionic constituents, and acidity concentration levels; and physical changes in the strata and structure. Cross correlations of the time series curves resulting from multiparameter analyses of ice cores from Antarctica and Greenland have been made. The results permit construction of a bipolar chemical stratigraphy chronology of volcanic events that is coherent with the $\delta^{18}O$ and Electrical Conductivity Method data sets and consistent back-in-time with historically recorded volcanic activity. (Auth. mod.)

F-53690

Bender, M., Sowers, T., Lipenkov, V.IA., **On the concentrations of O_2, N_2, and Ar in trapped gases from ice cores,** *Journal of geophysical research,* Sep. 20, 1995, 100(D9), p.18,651-18,660, 32 refs.

This paper presents data on the relative concentration and isotopic composition of O_2, N_2, and Ar in gases trapped in bubbles of polar ice. O_2/N_2 and Ar/N_2 ratios are generally lower than their atmospheric values, with O_2 depletions greater than those of Ar. In samples whose $O_2/Ar/N_2$ ratios are highly anomalous with respect to modern air, $\delta^{18}O$ of O_2 may be enriched by 0.1-0.2 per mill. There is no indication that $\delta^{15}N$ of N_2 is enriched by gas loss processes in any of the samples studied. The data suggest that anomalies in the composition of air in bubbles with respect to the modern atmosphere are due to gas loss from ice during and after coring by a process which fractionates elements according to their molecular diameter rather than according to their diffusivity. (Auth. mod.)

F-53693

Verbitsky, M.Y., Oglesby, R.J., **CO_2-induced thickening/thinning of the Greenland and antarctic ice sheets as simulated by a GCM (CCM1) and an ice-sheet model,** *Climate dynamics,* May 1995, 11(4), p.247-253, 26 refs.

The mean thickness of an ice sheet depends on the product of two poorly known quantities, the ice viscosity and the net snow accumulation rate. In this study, the viscosity of an ice sheet is adjusted in order to get a consistent value of this product for the present-day ice sheet volume and area, given the net snow accumulation rate calculated by an atmospheric general circulation model (GCM). This artificial rheology constant is maintained in further numerical experiments to compensate for systematic GCM errors in simulating the snow accumulation rate, and, therefore, thickening/thinning of ice sheets will depend mostly on the tendency in the net accumulation change rather than on its absolute value. Using this approach, the response of the Greenland and antarctic ice sheets to doubling CO_2 concentration is simulated and the horizontal distribution of possible thickening/thinning of polar ice obtained. It is found that initially, the region of thickening ice is close to the area of increased snowfall rate, but later it significantly changes under the influence of internal ice flow dynamics. (Auth. mod.)

F-53695

Dahms, H.U., **Life in a crystalline labyrinth—polar sea ice and its inhabitants** [Leben im gläsernen Labyrinth - polares Meereis und seine Bewohner], *Natur und Museum,* Jan. 1992, 122(1), p.17-34, In German. Refs. passim.

DLC QH5.S4

Following a brief review of research history of the biology of antarctic microscopic life in sea ice, the advent of the *Polarstern* expeditions in 1971, and the accompanying citations over a period of 150 years prior to 1990, various opportunities which opened for investigation are considered. These include the annual freeze/melt cycle and the resulting areas covered by sea ice in its various forms; sea ice as a living space and the forms which occupy the space; the adaptations that creatures have made to survive in this extreme habitat; the food availability to sustain the ice populations; and a brief comparison of arctic and antarctic biota.

F-53697

Pattyn, F., Decleir, H., **Subglacial topography in the central Sør Rondane Mountains, East Antarctica: configuration and morphometric analysis of valley cross profiles,** *Antarctic record,* Mar. 1995, 39(1), p.1-24, With Japanese summary. 19 refs.

An overview is given of all subglacial topography measurements carried out in the central Sør Rondane Mountains. Data of glacier valley cross and longitudinal profiles were obtained by gravimeter and radio echo soundings during Belgian expeditions and during JARE-28 and JARE-32. Based on these data, a map of the subglacial topography in the central mountain area was compiled. A method is presented for analyzing the morphometric characteristics of valley glacier cross profiles, which is shown to give better results than former power law equations. The morphometric analysis of the present glacierized valley cross profiles revealed a complex development regime, linked with the erosion potential of the glaciated area. (Auth. mod.)

F-53701

Kamiyama, K., **Report of "Workshop on the Glaciological Technology in Polar Regions",** *Antarctic record,* Mar. 1995, 39(1), p.68-73, In Japanese with English summary.

A workshop on Glaciological Technology in Polar Regions was organized to discuss recent progress in glaciological technology, including observation and analytical methods. Several techniques, including those of other disciplines such as deep drilling of the oceanic floor, were introduced for the future development of glaciological observations. Electrical support for automatic data logging instruments is important in a remote area under an extremely low temperature environment. Glaciological observations should be combined with information obtained from satellites. The discussion suggests that glaciologists would find it useful to develop and combine some techniques in order to understand glaciers more clearly. Some difficulties that should be overcome in the near future were also discussed. (Auth.)

F-53703

West, R.D., **Microwave emission from polar firn,** Seattle, University of Washington, 1994, 85p., University Microfilms order No.DA9509422, Ph.D. thesis. 49 refs.

The effects of layered structure and dense distributions of spherical ice grains on microwave emission from arctic and antarctic polar firn are studied. High spatial correlations between satellite emission measurements and important geophysical quantities such as temperature and snow accumulation rate were found. At lower frequencies such as 5 GHz, the dominant scattering mechanism affecting microwave emission from polar firn is reflection from hundreds of layer interfaces. The layered structure of firn is described by a stochastic model which generates centimeter scale discrete layers of varying density. Layer scattering reduces emission, and increases the polarization contrast (i.e., the difference between vertically and horizontally polarized emission). At higher frequencies such as 37 GHz, the dominant scattering influence is volume scattering by the ice particles. The size distribution of ice particles is particularly important in determining the emissivity of firn at 37 GHz. Particle scattering reduces emission, and also reduces the polarization contrast. The combination of particle and layer scattering creates a minimum in horizontally polarized emission as a function of frequency. (Auth. mod.)

F-53732

Saltzman, B., Verbitskiĭ, M., **Predicting the Vostok CO_2 curve,** *Nature,* Oct. 26, 1995, 377(6551), p.690, 9 refs.

With additional data from continued drilling of the Vostok ice core, now expected to reach a depth corresponding to 500 kyr ago, the authors offer as a further prediction of their model the expected variation in CO_2 for the additional 300 kyr, shown in a figure accompanying the brief note.

F-53797

Mel'nikov, I.A., **Chlorophyll *a*, suspended organic carbon and silicon in the sea ice of Admiralty Bay** [Khlorofill "a", vzveshennyĭ organicheskiĭ uglerod i kremniĭ v morskom l'du zaliva Admiraliti (o-v King-Dzhordzh, zap. Antarktika)], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.204, In Russian.

DLC QH84.2.P45

Investigation of sea ice chemical composition carried out in Admiralty Bay from July 5, 1987 (ice thickness 18 cm) to Oct. 27, 1987 (ice thickness 72 cm) showed that the silicon quantitative dynamics differed sharply from the concentration dynamics of the organic components: at every stage of ice formation, the silicon concentration in the ice was lower than in the sea water.

F-53810

Zibordi, G., Van Woert, M.L., Meloni, G.P., Canossi, I., **Intercomparisons of sea ice concentration from SSM/I and AVHRR data of the Ross Sea,** *Remote sensing of environment,* Sep. 1995, 53(3), p.145-152, 23 refs.

Special Sensor Microwave Imager (SSM/I) and Advanced Very High Resolution Radiometer (AVHRR) sea ice mapping capabilities are analyzed using antarctic data acquired during Nov. 1990 over the Ross Sea. Quantitative comparisons between sea ice concentrations obtained from SSM/I and AVHRR data show differences of -10% to +50% with average differences between 9% and 17%. These differences are mainly attributed to: a) sea ice reflectance and emissivity spatial variations occurring during the melting season, which reduce the accuracy of concentrations obtained with global tie points, and b) colocation inaccuracy between SSM/I and AVHRR grids. (Auth. mod.)

F-53822

Murphy, E.J., Clarke, A., Symon, C.J., Priddle, J., **Temporal variation in antarctic sea-ice: analysis of a long term fast-ice record from the South Orkney Islands,** *Deep-sea research, Part I,* July 1995, 42(7), p.1045-1062, 52 refs.

This paper uses a range of datasets to investigate the interannual variability in southern ocean sea-ice dynamics. The combined series covers the period from 1903 to the present. The analyses indicate that there has been a long term decline in the duration of sea-ice at the South Orkney Is. in the northwest Weddell Sea. This change has not been a simple linear decline but appears to have been the result of a reduction in the duration of fast-ice during the 1940s and 1950s. There was a pronounced sub-decadal year cycle in fast-ice duration at the South Orkney Is. from the mid-1960s to 1990. In recent years this cyclicity has broken down and fast-ice duration has been greater than expected. Analyses of satellite data have shown that fast-ice duration at Signy I. reflects the larger-scale ice dynamics of the Weddell Sea. Investigation of the Weddell Sea ice dynamics in relation to circumpolar ice extents indicates that the position of anomalies in the maximum sea-ice extent field precesses around the antarctic continent with a period of approximately 7-9 years. (Auth. mod.)

F-53827

Anklin, M., Barnola, J.M., Schwander, J., Stauffer, B., Raynaud, D., **Processes affecting the CO_2 concentrations measured in Greenland ice,** *Tellus,* Sep. 1995, 47B(4), p.461-470, 42 refs.

Detailed CO_2 measurements on ice cores from Greenland and Antarctica show different mean CO_2 concentrations for samples at the same gas age. The deviation between antarctic and Greenland CO_2 records increased by up to 20 ppmv during the last millennium. This work suggests that *in situ* production of CO_2 in Greenland ice could build up excess CO_2 after pore close off. Possible chemical reactions are the oxidation of organic carbon and the reaction between acidity and carbonate. It is concluded that the carbonate-acidity reaction is the most probable process to explain the excess CO_2 in the bubbles. The reaction could take place in very small liquid-like veins in cold ice, where the mobility of impurities is higher than in the ice lattice. At present, there exists no technique to measure the carbonate concentration in the ice directly. However, a comparison of CO_2 analyses performed with a dry- and a wet-extraction technique is sufficient to estimate the carbonate content of the ice. This estimate indicates a carbonate concentration in Greenland ice of about 0.4±0.2 μmol/l and a much lower concentration in antarctic ice. (Auth. mod.)

F-53830

Uchida, T., Shimada, W., Hondoh, T., Mae, S., Barkov, N.I., **Refractive-index measurements of natural air-hydrate crystals in an antarctic ice sheet,** *Applied optics,* Sep. 1, 1995, 34(25), p.5746-5749, 12 refs.

The refractive index of air-hydrate crystals found in a deep antarctic ice sheet was measured using a Mach-Zehnder interferometer. A small difference between the refractive indices of the air-hydrate crystals and the matrix ice crystal was measured by the fringe-shift method. It was found that the refractive indices of all air-hydrate crystals were larger than those of ice, and the average difference was 5.3×10^{-3}, even considering the refractive-index anisotropy of ice crystals. Because the refractive indices depend on the occupancy ratio of cagelike cavities by air molecules, the experimental results were compared with the calculated values using the Onsager cavity model. The present method is useful for estimation of the cavity occupancy ratio of air-hydrate crystals and also of the amount of air molecules in polar ice cores. (Auth. mod.)

F-53831

Ren, J.W., Qin, D.H., **Distribution of deuterium excess in surface snow of the antarctic ice sheet,** *Chinese science bulletin,* Oct. 1995, 40(19), p.1628-1633, 8 refs.

Analysis of stable isotope ratios for $\delta^{18}O$ and δD in snow and ice in cold regions has long been one of the most important tools for reconstructing paleoclimatic history. Recently, attention has been paid to the deuterium excess, which has also been recognized as a source of information about the vapor source regions. Distribution of deuterium excess in East Antarctica has been studied, but the data are mainly from some sites near the coast. In this note, the measurement result of stable isotope ratios in snow samples collected along the route of the 1990 International Trans-Antarctic Expedition is used to reveal the distribution of deuterium excess in surface snow over the antarctic ice sheet, and its significance is tentatively interpreted. (Auth. mod.)

F-53833

Moctezuma Flores, M., Maitre, H., Parmiggiani, F., **Sea-ice velocity fields estimation on Ross Sea with NOAA-AVHRR,** *IEEE transactions on geoscience and remote sensing,* Sep. 1995, 33(5), p.1286-1289, 13 refs.

A complete methodology is proposed for automatic tracking of sea-ice in daylight AVHRR (Advanced Very High Resolution Radiometer) data. Two aspects are outlined: the use of partially cloudy monocular images and the estimation of ice pack trajectories along an image sequence. First, a classification technique is applied for the detection of snow-ice regions. Then, an optimal matching filter is used for the sea-ice motion estimation. The derived vector field is homogeneous and shows the ice pack motion along a three-day image data sequence. (Auth. mod.)

F-53834

Uchida, T., **Recent progress in Vostok ice core analysis studies on ancient air stored in ice cores,** *Seppyo,* June 1995, 57(2), p.173-174, In Japanese. 17 refs.

Selected reports through 1994 on air content and clathrate hydrates in the Vostok ice core are briefly reviewed. Seventeen references are cited of which three are in Japanese and 14 are in English. Periods of low air content in the ice core indicate periods of large fluctuations in ice sheet thickness. The brittle zone at a depth of about 250-750 m where the air content cannot be well determined, indicates the transition between the last glacial maximum and the interglacial stadial. Since air bubbles are decreased and clathrate hydrates are formed in ice at low temperatures and high pressures, it is suggested that the ratio of bubbles to hydrates may be used to distinguish periods of glacials and interglacials.

F-53845

Aldworth, E., **Snow and ice characteristics of the Bellingshausen Sea, during the spring melt,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1021-1045, 15 refs.

Snow and ice characteristics are discussed relating to the marginal ice zone and the interior pack ice of the Bellingshausen Sea during the spring melt of 1992. ERS-1 SAR satellite imagery collected between late Nov. and early Dec. 1992 was used to determine the location and movement of the ice edge and to estimate ice concentration in the marginal ice zone during this period. Using two consecutive scenes of image data, the motion of selected floes within the interior pack ice was determined. In order to provide a better understanding of the physical and dynamic processes in this region, the analysis of ground truth collected at a number of stations is discussed in conjunction with the interpretation of satellite imagery. (Auth.)

F-53911

Nishio, F., **Recent studies on snow and ice using microwave remote sensing—glaciers and ice sheet studies by SAR interferometry,** *Seppyo,* Sep. 1995, 57(3), p.269-271, In Japanese. 15 refs.

The use of satellite microwave SAR for interferometry of ice sheets in Antarctica and Greenland is briefly reviewed. Fifteen references are cited of which one is in Japanese and the rest are in English. Six of the references, all in English, are explicitly pertinent to Antarctica and others are implied. It is suggested that future research may use interferometric SAR data to model fluctuations and flow of ice sheets.

F-53919

Mayewski, P.A., et al, **Ice-core based, Late Holocene history for the Transantarctic Mountains, Antarctica,** *American Geophysical Union. Antarctic research series,* 1995, 67(4), Contributions to antarctic research IV, p.33-45, 47 refs.

DLC G845.C67 vol.67, no.4, 1995

Ice core records developed from two shallow sites in the Transantarctic Mountains provide documentation of much of the Holocene paleoenvironmental history of this region. From the more southerly site, Dominion Range, a 7000-year long record reveals change in the influence of tropospheric transport to the region. At this site, milder conditions and increased tropospheric inflow prior to 1500 yr BP are characterized by increased seasalt (ss), terrestrial and marine biogenic inputs. Increased persistence and/or extent of polar stratospheric clouds accompanying generally cooler conditions characterize much of the period since 1500 yr BP. From the more northerly site, Newall Glacier, the dramatic influence of the retreat of grounded ice from McMurdo Sound dated at <6600 yr BP dominates much of the ice core record. This regional environmental change is documented by massive influxes to the core site of evaporitic salts from areas exposed during low lake level stands. During the past 150 yr, both Dominion Range and Newall Glacier appear to be experiencing an overall increase in the exposure of ice-free terrain. (Auth.)

F-53925

Klokov, V., Diemand, D., **Glaciology of the McMurdo Ice Shelf in the area of air operations,** *American Geophysical Union. Antarctic research series,* 1995, 67(4), Contributions to antarctic research IV, p.175-195, 12 refs.

DLC G845.C67, vol.67, no.4, 1995

Two experimental runways have been built on the McMurdo Ice Shelf at the Pegasus site, about 13 km south of McMurdo Station. One of these runways was constructed using compacted snow technology while the other has a temporarily exposed blue ice surface. Conditions here are such that the annual snowfall can be removed entirely, baring the blue ice of the shelf, or compacted in place to preserve its reflective protective cover and to provide a strong surface capable of supporting wheeled aircraft traffic. During the 1991-92 and 1992-93 austral summers, detailed glaciological studies were conducted on the McMurdo Ice Shelf to identify snow accumulation, stratigraphy and the summer melt behavior. On the basis of the data collected, a runway location midway between the Pegasus site and Williams field appears to be an excellent site for construction of a permanent compacted snow runway on a deep snow foundation. This runway would be similar to the one used by wheeled aircraft at Russia's Molodezhnaya Station. Such a runway in the McMurdo area, in conjunction with a blue ice runway at the Pegasus site, would provide for wheeled aircraft access throughout the austral summer. This would eliminate the need for annual construction of the sea ice runway and for continued maintenance of Williams Field. (Auth. mod.)

F-53961

Chisholm, W., Rosman, K.J.R., Boutron, C.F., Candelone, J.P., Hong, S., **Determination of lead isotopic ratios in Greenland and antarctic snow and ice at picogram per gram concentrations,** *Analytica chimica acta,* July 31, 1995, 311(2), p.141-151, 23 refs.

Ultra-clean procedures have been developed which allow the isotopic composition of picogram quantities of lead to be measured in snow and ice from Greenland and Antarctica. Ultra-clean collection, storage and processing techniques were used to analyze samples containing as little as ca. 2 pg Pb/g. The concentration and isotopic composition were measured simultaneously by isotope dilution mass spectrometry using a lead spike enriched in ^{205}Pb. Although the precision of the isotopic ratios improved with the size of the sample, a precision of ca. 0.2% could be achieved on a few tens of pg of Pb, enabling small differences in isotopic composition to be resolved in deep ice cores and surface snow. (Auth.)

F-54015

Kotliakov, V.M., **World of snow and ice** [Mir snega i l'da], Moscow, Nauka, 1994, 285p., In Russian. Refs. p.284-285.

This work deals with the characteristics of snow and ice phenomena, the history of their development and their significance in the lives of people. For the past 30 years the author has travelled to ice and snow covered regions of the world, including Antarctica. His experiences, possible routes to follow through these regions, and problems associated with the various routes are discussed. (Auth. mod.)

F-54020

Johannessen, J.A., ed, Guymer, T.H., ed, **Oceanic remote sensing and sea ice monitoring,** *SPIE—The International Society for Optical Engineering,* 1994, Vol.2319, 182p., Refs. passim. For selected papers see 50-1510 through 50-1517 or F-54022, F-54023, and J-54021.

DLC GC10.4.R4O28 1994

This book contains the proceedings of a meeting on oceanic remote sensing and sea ice monitoring held in Rome, Italy, Sep. 26, 1994. Of a total of 18 papers, 8 are pertinent to polar oceans and of those, three are explicitly pertinent to the Antarctic. The antarctic papers deal with a comparison of satellite altimetry and the FRAM (Fine Resolution Antarctic Model) of circulation in the southern ocean; SMMR (Scanning Multichannel Microwave Radiometer) and SSMI (Special Sensor Microwave Imager) satellite remote sensing of sea ice in the Arctic and Antarctic; and near real-time sea ice maps of the southern ocean from satellite remote sensing data.

F-54022

Bjørgo, E., Johannessen, O.M., **Sea ice concentrations derived from SMMR and SSMI: parameter retrieval and algorithm evaluation,** *SPIE—The International Society for Optical Engineering,* 1994, Vol.2319, Oceanic remote sensing and sea ice monitoring, Rome, Italy, Sep. 26, 1994. Edited by J.A. Johannessen and T.H. Guymer, p.114-125, 14 refs.

Satellite passive microwave sensors are the most effective means to monitor sea ice on a global scale. 18GHz horizontal and vertical and 37GHz vertical polarized brightness temperatures from the Scanning Multichannel Microwave Radiometer (SMMR) are compared to the 19GHz horizontal and vertical and 37GHz vertical polarized brightness temperatures from the Special Sensor Microwave Imager (SSMI) over the Arctic and Antarctic during the 1987 overlap period in order to merge the two time series. The Norwegian NORSEX and NASA Team multi-frequency algorithms are used on the overlapping SMMR and SSMI data sets. Sea ice extent and area are calculated and the algorithm performance is compared for both hemispheres. The NORSEX algorithm tends to give approximately 10% higher sea ice concentration values than the NASA Team algorithm. (Auth.)

F-54023

Blackford, C., Howes, S., Whitelaw, A., Laxon, S.W., Mantripp, D.R., **Assessment of a demonstration project to supply near real time sea ice information to end users,** *SPIE—The International Society for Optical Engineering,* 1994, Vol.2319, Oceanic remote sensing and sea ice monitoring, Rome, Italy, Sep. 26, 1994. Edited by J.A. Johannessen and T.H. Guymer, p.145-154, 4 refs.

During Mar. 1994 ESYS Limited and the University College London Mullard Space Science Laboratory (MSSL) operated a sea ice demonstration project to supply near real-time sea ice maps in the southern ocean. The sea ice information was derived from a number of data sources: DMSP SSM/I data; ERS-1 SAR and radar altimeter fast delivery data; NOAA AVHRR data; and PoSAT-1 imagery. The maps were supplied to three users, two involved in yacht races in the southern ocean and a ship on an oceanographic research cruise in the waters of the Princess Elizabeth Trough region of Antarctica. The demonstration was successful, supplying the users with sea ice information which they had previously not received and combining data from various sources to produce sea ice maps. The demonstration also developed operational skills within ESYS and enabled the transfer of knowledge from MSSL to ESYS. (Auth.)

F-54041

Legrand, M., **Atmospheric chemistry changes versus past climate inferred from polar ice cores,** Dahlem Workshop on Aerosol Forcing of Climate, Berlin, Germany, Apr. 24-29, 1994. Environmental Sciences Research Report. No.17. Edited by R.J. Charlson et al, Chichester, John Wiley & Sons, 1995, p.123-151, Refs. p.148-151.

DLC QC981.8.C5 D25

This paper focuses on soluble minerals and organic species that are trapped in polar ice. The basics of the ionic composition of snow as well as origins and sources of impurities in polar regions are presented. Results of chemical studies of polar ice, in terms of chemical composition of the past atmosphere, are then discussed. Data on sodium and calcium (good tracers of sea salt and soil dust aerosols, respectively) from Greenland and antarctic depth profiles suggest that, in the past, the primary (sea salt and soil dust) aerosol content of the high-latitude atmosphere was strongly enhanced during cold climates. It is shown that natural and anthropogenic phenomena have modulated the secondary aerosol content of the atmosphere of both Greenland and Antarctica. Sulfate-depth profiles show that fossil-fuel combustion has enhanced sulfate concentrations in Greenland snow by a factor of two to four since the beginning of this century but that no similar trend occurred in Antarctica. Numerous studies have demonstrated that the sulfate concentrations of Greenland and antarctic ice increased very often, but for short time periods after large volcanic eruptions. Ice core data also suggest that the nonvolcanic natural sulfate background level is mainly marine and biogenic (dimethylsulfide [DMS] emissions) in origin in Antarctica, under the present climatic conditions as well as during the last two ice ages. It is also suggested that the rates of these DMS emissions have changed in the past in response to short- and long-term climatic variations. (Auth. mod.)

See also:
A-51684 A-51693 A-51700 A-52200 A-52640 A-53513 A-53565 A-53566 B-51691 B-51703 B-51766 B-52252 B-52253 B-52453 B-52535 B-52569 B-52573 B-52656 B-52836 B-52872 B-53007 B-53008 B-53185 B-53257 B-53277 B-53328 B-53345 B-53447 B-53448 B-53547 B-53599 B-53601 B-53854 B-53978 C-51850 C-52425 C-53364 D-51860 E-51673 E-51674 E-51755 E-51786 E-51839 E-51887 E-51889 E-51919 E-51929 E-51936 E-51939 E-51940 E-51947 E-51950 E-51960 E-52015 E-52029 E-52076 E-52114 E-52221 E-52229 E-52400 E-52402 E-52437 E-52439 E-52617 E-52701 E-52752 E-52838 E-52972 E-53027 E-53040 E-53213 E-53214 E-53287 E-53363 E-53407 E-53408 E-53616 E-53915 E-54009 G-52047 G-52376 G-52407 G-52603 G-52604 G-52657 G-53245 G-53534 G-53745 G-53924 I-51705 I-51837 I-51838 I-51855 I-51869 I-51870 I-51883 I-51985 I-51986 I-51989 I-52041 I-52073 I-52087 I-52089 I-52091 I-52131 I-52133 I-52141 I-52184 I-52186 I-52187 I-52188 I-52230 I-52233 I-52362 I-52393 I-52394 I-52420 I-52421 I-52459 I-52492 I-52494 I-52498 I-52572 I-52616 I-52621 I-52651 I-52759 I-52760 I-52769 I-52770 I-52803 I-52805 I-52848 I-53041 I-53044 I-53045 I-53066 I-53074 I-53122 I-53193 I-53269 I-53281 I-53285 I-53286 I-53314 I-53315 I-53367 I-53373 I-53375 I-53425 I-53430 I-53470 I-53472 I-53483 I-53486 I-53487 I-53492 I-53507 I-53692 I-53724 I-53835 I-53868 I-53910 I-53996 I-54011 J-51695 J-51797 J-51832 J-51874 J-51875 J-51878 J-51881 J-51962 J-51983 J-51984 J-52040 J-52046 J-52215 J-52228 J-52294 J-52295 J-52515 J-52622 J-52680 J-52744 J-52948 J-52977 J-53042 J-53046 J-53137 J-53433 J-53458 J-53626 J-53628 J-53655 J-53656 J-53709 J-53840 J-53846 J-53847 J-53851 J-53852 J-53856 J-53860 J-53866 K-51858 K-52852 K-53002 K-53937 L-51662 L-51737 L-51945 L-52018 L-52019 L-52243 L-52988 L-53024 L-53026 L-53031

G. LOGISTICS, EQUIPMENT & SUPPLIES

G-51698

Lugg, D.J., **Antarctica as a space laboratory,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.229-242, 33 refs.

DLC G845.5.A54 1994

This SCAR conference has shown how antarctic science is important in relation to global problems. However, little has been said concerning the social impacts of global change. Antarctica as a space laboratory, with collaboration of international space and polar agencies, makes important contributions to social and other human research. Such research which is necessary for space will help to optimize living and working conditions for scientists and others in Antarctica. But there are implications for populations at large, as research necessary for space may yield solutions to some of the health problems faced on Earth. The use of Antarctica as an analog is based on its uniquely isolated populations. If these populations become less isolated as was shown recently by the mid-winter flight of a US Hercules aircraft to McMurdo Station to repatriate a patient from the nearby Scott Base, then Antarctica as the best location to support the Space Exploration Initiative will be lost. It is therefore time that SCAR-sponsored scientific studies on human biology and medicine be organized.

G-51853

Tunik, L., ed, **1994-1995 Northern Sea Route directory of ice-breaking ships; reference for the Arctic and Antarctic transport and offshore industries,** New York, Backbone Publishing Company, 1994, 217p., Refs. p.212-217.

This directory contains detailed information about Russian-built ships capable of navigation on the NSR (Northern Sea Route). A total of 699 ships (537 under the Russian flag) are listed. In addition to ice-related technical and ownership information, there are statistics, indexes, and some help on administrative and technical requirements to be met for navigation on the NSR. The ships listed here can also navigate other ice-infested arctic and antarctic waters. (Auth. mod.)

G-51854

Antarctic Traverse Workshop, Washington, D.C, May 2-4, 1994, Melendy, R., ed, Blaisdell, G.L., ed, **Summary report,** Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, 1994, Var. p.

The main focus of this workshop was on heavy hauling oversnow for supply of inland stations rather than on short, light traverses for purely scientific purposes. The attendees were from Argentina, Australia, Canada, France, Germany, Italy, Norway, Russia, South Africa, Sweden, the United Kingdom, and the United States. There were no written proceedings. Most of the text consists of handouts and overhead slides. Topics of discussion include traverse experiences; route selection; crevasse detection; and equipment, in particular, caterpillar tractors, caterpillar trailers, and sleds.

G-51856

Burton, M., ed, Australian Working Group for Antarctic Astronomy, **Scientific potential for astronomy from the Antarctic Plateau,** *Astronomical Society of Australia. Proceedings,* Aug. 1994, 11(2), p.127-150, 29 refs.

Our knowledge of the universe comes from recording the photon and particle fluxes incident on the Earth from space, and requires sensitive measurement across the entire energy spectrum, using large telescopes with efficient instrumentation located on superb sites. The Antarctic Plateau is an available observation site which meets the needs of astronomy researchers at a fraction of the cost of a space station. Its advantages are manifold, including the following: the extreme cold reduces the thermal background in the near-infrared; the low atmospheric water vapor content significantly improves transmission throughout the infrared and millimeter regimes; the tenuous air reduces absorption at all wavelengths; the steadiest air offers superior sighting to any other ground-based location; and it has the clearest air, both particulate and electromagnetic, on the Earth. The geographical location contributes in several ways: the high latitude allows continuous monitoring of sources; long north-south baselines for VLBI exist, and complete global coverage of some phenomena is possible; the proximity to the South Magnetic Pole extends to lower energy the cosmic ray secondaries that reach the surface; and huge quantities of ice are available as pure absorbers of incident particles such as neutrinos. There are also formidable logistical and engineering obstacles to developing an observatory on the Antarctic Plateau. The scientific case for antarctic astronomy rests on the merit of programs that could be carried on exclusively on the Plateau. This document analyzes and presents these programs. (Auth. mod.)

G-52043

Pearson, M., **Sledges and sledging in polar regions,** *Polar record,* Jan. 1995, 31(176), p.3-24, 78 refs.

Sledges have been used for millennia in arctic and sub-arctic regions. Until the advent of British Arctic land exploration in the 19th century, explorers in these regions had relied on indigenous sledges. The British, and individuals from other nations engaging in polar exploration, often faced different conditions and challenges from those that had faced indigenous peoples, and so a period of adaptation and invention began, to develop sledges that better suited the needs of European survey parties. This paper looks at the range of indigenous sledges and the development of various polar sledge types based on indigenous ski-runner, edge-runner, and toboggan styles of sledges. The development of the Nansen sledge, which became the norm in the Antarctic, is discussed, and the issues and debates involving manhauling versus dog-hauling and the relative effectiveness of sledges and motive power as shown by recorded sledging performances are outlined. (Auth.)

G-52047

Bateman, A.P., **Performance of a surface station on an antarctic ice shelf,** Marine, offshore and ice technology. Edited by T.K.S. Murthy, P.A. Wilson and P. Wadhams and Ice Technology Conference, 4th, Southampton, UK, Sep. 15-16, 1994, Southampton, UK, Computational Mechanics Publications, 1994, p.311-319, 8 refs.

Halley is a scientific station on the Brunt Ice Shelf. The three main buildings are wooden single-storey structures supported about 5 m above the snow surface by steel platforms and columns. The buildings are raised annually to overcome the mean snow accumulation of 1 m per year. This paper shows the development of snow drifts around the buildings over the 5 years since construction began. Differential movement and inclination of the steel columns are described. Possible causes of this deformation, including creep within the snowdrifts, are examined. (Auth. mod.)

G-52085

Bannasch, R., Wilson, R.P., Culik, B.M., **Hydrodynamic aspects of design and attachment of a back-mounted device in penguins,** *Journal of experimental biology,* Sep. 1994, Vol.194, p.83-96, 36 refs.

DLC QH301.J68 vol.194 Sep 1994

Wind tunnel and water tank experiments were carried out on a penguin model in order to optimize the shape and attachment of a back-mounted datalogger. Device-induced turbulence was minimized when the unit was placed in the most caudal position. Drag was further reduced by shaping the device to match the body contour. The hydrodynamic resistance of the package could be reduced by 65% compared with an earlier unit. These results are discussed together with results from new studies on kinematics and energetics of underwater swimming of live instrumented penguins. (Auth.)

G-52102

Nishimura, J., et al, **Polar Patrol Balloon,** *Journal of aircraft,* Nov.-Dec. 1994, 31(6), p.1264-1267, 4 refs.

From late Dec. of 1990 to early Jan. of 1991 the National Institute of Polar Research, in collaboration with the Institute of Space and Astronautical Science, launched two large zero-pressure balloons from Showa Station. The balloon launched on Dec. 25 returned near Showa Station after 15 days of flight, keeping a constant altitude of about 30 km. It finally accomplished almost a one and half circumpolar flight. The total flight duration was about 40 days. This article will describe the balloon system and the flight behavior of the balloon.

G-52345

Turner, J., Lachlan-Cope, T.A., **ARIES Project: satellite imagery of the Antarctic,** *NERC news,* Jan. 1994, No.28, p.24-26.

The authors describe the installation and applications of a new satellite receiving system known as ARIES (Antarctic Reception of Imagery for Environmental Studies) at Rothera Station.

G-52370

U.S. Naval Support Force Antarctica, **Operation Order 201. "Operation Deep Freeze" 94/95,** Sep. 1994, var. p.

This Operation Order provides basic guidance for the conduct of "Operation Deep Freeze" 94/95, the annual U.S. Department of Defense operational and logistic support for the United States Antarctic Program (USAP). It lists 11 Annexes, including air and ship operations, logistics, administration, medical/dental services and requirements, field operations and communications. Eleven Appendices include air and ship operation schedules, scientific programs, communications plan, uniform standards and requirements, and a distribution list.

G-52376

Wicks, F., **Nuclear waste: an international problem and evaluating the antarctic continent as a disposal site,** Intersociety Energy Conversion Engineering Conference, 29th, Monterey, CA, Aug. 7-11, 1994. Collection of technical papers. Part 3, [1994], p.1185-1192, 23 refs.

The end of the cold war is resulting in dismantling of thousands of nuclear weapons in the United States and the former Soviet Union. An estimated 40,000 pits of highly enriched uranium and plutonium must be converted for use in electric power reactors, or be continuously guarded, or safely disposed of. This paper suggests that the time has come to reconsider the entire nuclear fuel and material cycles for both the electric power and weapons programs, and further to re-define nuclear waste as a global environmental problem that should be handled by an international agency with responsibility to collect this waste and dispose of it at a single repository. The best of the bad options may be disposal in the ice of the inland antarctic continent. A preliminary identification of existing treaties and potential sites is presented, along with recommendations for further research. (Auth.)

G-52407

Khanifar, A., Ridley, J.K., Bamber, J.L., Card, R.P., **Microwave scatterometry in support of space-borne scientific missions,** *Electronics & communication engineering journal,* Dec. 1994, 6(6), p.281-288, 6 refs.

The interpretation of satellite radar observations of the Earth's surface requires models to link the observations to physical processes. These models require validation through surface measurements. This paper describes a mobile radar scatterometer designed to complement the vertical incidence measurements of satellite radar altimeters. The instrument has been successfully deployed in Antarctica and an Australian desert to make measurements contemporaneous with satellite observations. The key findings from these field experiments are briefly described and results which have implications for synthetic aperture radar studies of similar terrain are presented.

G-52456

Corry, M.J., Sheers, R.L., **Current ANARE machinery and vehicles,** *Aurora,* Sep. 1992, 12(1), p.8-12, 9 refs.

In photographs and text a summary is given of the array of oversnow vehicles in use at Australian antarctic stations in 1992. Included are general details of type, use, power packs, fuel type, speed, manufacturer, transmissions, amphibious or overland capabilities, and purchase and maintenance costs.

G-52603

Haskell, T.G., Robinson, W.H., **Sensitive and robust strainmeter for ice studies,** *Cold regions science and technology,* Nov. 1994, 23(1), p.99-104, 6 refs.

A strain gage to measure the relative horizontal displacement between two plates embedded 500 mm apart in ice, for use in both fresh and sea ice, has been developed and tested in the Antarctic at temperatures down to -20°C. The strain gage has a sensitivity of about $8x10^{-9}$ and is unaffected by the vertical accelerations which can occur when waves propagate through floating ice sheets. It is robust enough to allow quick installation, can be buried in the ice, has precise autozeroing functions which enable creep to be monitored, has a response time less than 0.02 sec and can present the strain results in a variety of formats. The gage has been used to study waves in floating ice-sheets generated by moving vehicles, and to monitor strains within the Erebus Glacier Tongue. (Auth. mod.)

G-52604

Haskell, T.G., Robinson, W.H., **Ice-screw system for anchoring test equipment on to ice,** *Cold regions science and technology,* Nov. 1994, 23(1), p.105-107.

In order to attach hydraulic test equipment to sea ice, a system using ice-screws has been developed over the last few seasons in Antarctica. The ice-screws used to date all have an outside diameter of 90 mm to match that of a tapping device which ensures accurate placement of the screws in predrilled holes in the ice. The lengths of the screws vary from 200 to 900 mm, depending on the intended use. The load-carrying capabilities of the shorter ice-screws has been found to be typically 75 kN; that of full-length screws exceeded the maximum force available in the hydraulic test equipment, approximately 200 kN. (Auth. mod.)

G-52611

U.S. Naval Support Force Antarctica, **End of season report: Operation Deep Freeze 94/95,** Apr. 1995, var. p.

This report describes the military support to the National Science Foundation in conjunction with the U.S. antarctic program. Support was provided by various organizations and commands from the Department of Defense and Department of Transportation under the operational control of Commander, U.S. Naval Support Force, Antarctica from June 1994 to Mar. 1995 as Operation DEEP FREEZE 94-95. The Naval Support Force provided command and control facilities and medical services to McMurdo Station residents and the logistics and communications pipeline for resupply of McMurdo, Amundsen-Scott, Byrd Surface Camp, and other seasonal field camps, plus support for the nearby New Zealand station at Scott Base, the Italian station at Terra Nova Bay and the Russian station at Vostok. This report provides a summary of significant events during the operating period.

G-52647

House on skis for BAS, *NERC news,* Jan. 1995, No.31, p.13.

British designers have developed a two-storey prefab house on skis to withstand the harsh conditions faced by British Antarctic Survey scientists and technicians working at Halley Station. A description of the building and its specifications are given.

G-52657

Blaisdell, G.L., Lang, R., Crist, G., Kurtti, K., Harbin, J., Flora, D., **Construction of a glacial ice runway and wheeled flight operations at McMurdo, Antarctica,** Cambridge, England, Scientific Committee on Antarctic Research, [1994], 12p., 4 refs. Presented at the 6th SCALOP (Standing Committee on Antarctic Logistics and Operations) Symposium of the 23rd SCAR meeting, Aug. 29-31, 1994, Rome, Italy.

Beginning in the 1989-90 summer season, engineering studies were directed at determining the feasibility of producing a runway for wheeled aircraft on the Ross Ice Shelf near McMurdo, specifically for use during the period after the sea ice deteriorates. Based on historical records and air photos, a site 13 km south of McMurdo was chosen in an area with a thin, but permanent and complete, snow cover. At this location, called the Pegasus site, the snow is underlain by a contiguous mass of glacial ice that is derived from a combination of natural seasonal melt water (near the surface) and ice formed by metamorphosis of snow. A C-141 flight at the Pegasus runway in Feb. 1994 marked the final test in a five-year development program to demonstrate the feasibility of a semipermanent glacial ice runway capable of supporting heavy wheeled aircraft at a site easily accessible to McMurdo. In the later phases of developing the runway, numerous working flights took place using LC-130s operating on wheels and a conventional C-130. (Auth. mod.)

G-52690

Teshebaev, Sh.B., **Microclimate of mobile buildings in the coastal zone of Antarctica** [Mikroklimat mobil'nykh zdaniĭ v pribrezhnoĭ zone Antarktidy], *Problemy Arktiki i Antarktiki; sbornik stateĭ,* 1994, Vol.67-68, p.165-169, In Russian. 4 refs.

The possibilities of using mobile buildings made of lightweight construction materials as residences in Antarctica are examined from a hygiene point of view. Full-scale investigations were conducted in these homes. It was determined that supplementary heating of wall panels and at notch points in wood and window openings, as well as a balanced heating system, were indispensable. (Auth. mod.)

G-52824

Hauck, R., **REILS and ... penguins,** *Journal of air traffic control,* Dec. 1994, 36(4), p.44-45.

This note details the development of a solar-powered battery system designed to power airfield runway illumination in antarctic environments.

G-52859

Roland, N.W., **Planning and scientific program of the GEISHA Expedition,** *Polarforschung,* 1993 (Publ. 1994), 63(1), p.1-3, With German summary. 3 refs.

The first German geological expedition to the Shackleton Range (GEISHA) in 1987-88 had a planning and preparatory phase of four years, during which the logistics concept for the expedition had to be changed twice. The expedition was logistically complicated and required the support of an icebreaker (RV *Polarstern*), two fixed-wing aircraft *(Polar 2* and *Polar 4)*, and two helicopters, as well as the standard field equipment, including motor toboggans and sledges. The scientific program brought together earth scientists who had worked before in various other structural units of the Antarctic. It was based on the knowledge of the previous British and Soviet expeditions and tried to solve some of the remaining problems, especially with respect to stratigraphy, but also included structural, geological, and plate tectonic aspects. (Auth.)

G-52860

Kothe, J., Roland, N.W., Bässler, K.H., **Logistics of the GEISHA Expedition,** *Polarforschung,* 1993 (Publ. 1994), 63(1), p.5-8, With German summary. 3 refs.

The geological expedition to the Shackleton Range (GEISHA 1987-88) was not only the southernmost German Antarctic expedition, but also a logistically complex operation. Additionally, the initial logistic concept had to be modified during the planning and preparation phases. Instead of transport to the Shackleton Range by land, two ski-equipped aircraft were necessary. Additionally, the RV *Polarstern* had to be used to reach the Brunt Ice Shelf near Halley Station, where the geological expedition to the Shackleton Range started. To make optimum use of the short time available, the field work was supported by two helicopters in addition to ski-doos and sledges, which were available at each camp, making it possible to continue the scientific programs even on white-out days. (Auth.)

G-53083

Griswold, S.S., **Portable Habitat for Antarctic Scientific Research (PHASR),** *U.S. National Aeronautics and Space Administration. Contract Report,* 1992, NASA-CR-195118, Annual Summer Conference, 8th: NASA/USRA University Advanced Design Program (USRA), June 15-19, 1992. Proceedings, p.108-113, N94-25681.

The Portable Habitat for Antarctic Scientific Research (PHASR) is designed as a versatile, general purpose habitat system that addresses the problem of functional space and environmental soundness in a partially fabric-covered shelter. PHASR is designed for remote field site applications that can be quickly deployed. PHASR will also provide four scientists with a comfortable and efficient use of interior space. PHASR is a NASA/USRA Advanced Design Program project conducted at the University of Houston College of Architecture, Sasakawa International Center for Space Architecture. (Auth.)

G-53182

Straight, C.L., Flynn, M.T., Bubenheim, D.L., **Siting survey and interface analysis for the CELSS Antarctic Analog Project pilot studies,** *Society of Automotive Engineers. SAE technical paper series,* 1995, No.951694, 9p., Presented at the 25th International Conference on Environmental Systems, San Diego, California, July 10-13, 1995. 15 refs.

The CELSS Antarctic Analog Project (CAAP) is being implemented in phases. Phase 1 will deploy a vegetable food production chamber to Amundsen-Scott Station. An on-site survey to find a suitable site for the Phase 1 chamber identified a number of candidate locations. The parameters considered included space requirements and availability, proximity to appropriate utilities, proximity to the Utilidor, structural integrity and clearance, efficacy of planned operations, crew accessibility, life-style and on-going Station activities, future Station redesign activities and future expansion into CAAP Phase II. This paper presents those locations and the trade-offs leading up to a choice of the most likely site for the CAAP Phase 1 chamber. (Auth. mod.)

G-53187

Rojas Silva, M., **Inauguration of the "Profesor Julio Escudero" base** [Inauguración de la Base Profesor Julio Escudero], *Boletín Antártico Chileno,* May 1995, 14(1), p.13-15, In Spanish.

On Feb. 5, 1995, in a ceremony headed by the Director of INACH, the new base "Profesor Julio Escudero" was inaugurated in the vicinity of the base Eduardo Frei on Fildes Peninsula. The building will house 12 scientists, with 3 laboratories for biological and upper atmosphere investigations.

G-53232

Roper, C., **Scott Base ionosonde,** *New Zealand antarctic record,* 1983, 4(3), p.3-5.

Instruments in the Scott Base science laboratory are described, including the history of installation and operation of the first automatic ionosonde, equipment added to it, and its replacement by a modern unit in 1983.

G-53238

Mathews, J.C., **Report on the preliminary work required to establish an extended overland transportation capability for the United States Antarctic Program,** Washington, DC, National Science Foundation, Mar. 1988, 19p. + append., Contract No.87-GR-0023.

This report discusses the preliminary work and rough-order-of-magnitude funding required to determine the feasibility of establishing a safe and practical overland traverse capability between McMurdo and Amundsen-Scott Stations for the United States Antarctic Program. (Auth. mod.)

G-53245

Higham, M., **Logistical and operational aspects of the Lambert Glacier Basin Traverse,** *Aurora,* June 1995, 14(4), p.8-15.

This paper describes some of the logistical and operational features of the oversnow traverse program that the Australian Antarctic Division (AAD) has run in recent years. The Lambert Glacier Basin traverse, part of LARGE (Lambert Amery Regional Glaciology Experiment), is a glaciological exploration and research program conducted from Mawson Station and forming part of a longer-term effort to investigate the glaciological characteristics of the ice sheet of East Antarctica. During the 1980s Australian traverse activity was based out of Casey in Wilkes Land. A figure shows traverse routes covered by the AAD since 1974, mostly for glaciological purposes.

G-53394

Lunardini, V.J., Rand, J.H., **Thermal design of an antarctic water well,** *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1995, 98p., ADA-295 513, 22 refs.

The thermal and mechanical aspects of a potable water reservoir, formed at depth in a permanent snowfield in Antarctica, are detailed. The thermal model can be used for preliminary design, to predict reservoir size and depth, water temperature and mass, and energy requirements as a function of time. Predictions are made for the South Pole environment, but the model is valid for other permanent snowfields. The reservoir characteristics are influenced by the rate and timing of potable water removal during the lifetime of the reservoir. (Auth.)

G-53434

International Design for Extreme Environment Assembly, 2nd, Montreal, Oct. 24-27, 1993, **Growth and environment: challenging extreme frontiers; IDEEA Two Conference Proceedings,** Montreal, Canada, 1994, 691p., Refs. passim. For selected papers see 49-6376 through 49-6390 or A-53437, G-53435, G-53436, G-53438 through G-53442.

These proceedings cover a broad range of issues, needs, challenges, technologies and concepts related to different types of extreme environments. Such environments include, but are not limited to space, oceans, the Arctic, Antarctica [e.g., Dome C, Amundsen-Scott, Casey, Concordia, Oasis and Vostok stations], deserts, mountains, and natural and man-made disaster areas. All of these environments share many kinds of technical and operational priorities. Key among these is the need for advanced construction systems, efficient energy, effective and environmentally-responsive waste management, versatile and reliable automation/robotic devices, and emergency accommodations. (Auth. mod.)

G-53435

Cucinotta, A., Godon, P., Ponzo, U., **Concordia Station,** International Design for Extreme Environment Assembly, 2nd, Montreal, Oct. 24-27, 1993. Growth and Environment: challenging extreme frontiers; IDEEA Two conference proceedings, Montreal, Canada, 1994, p.17-36.

The cooperative agreement between the Institute Francais pour la Recherche et la Technologie Polaires and the Programma Nazionale di Richerche in Antartide (the Italian Antarctic Project) has the aim of building a permanent station on the Antarctic Plateau for a program of scientific and technological research. The base, called Base Concordia, will be built on the Antarctic Plateau at about 1000 km from the coastal stations of Dumont d'Urville and Terra Nova Bay. It will have the capacity to house 16 people during winter and 32 during summer. Its design is environment-friendly and consequently a modular construction has been foreseen, with complete retrograding of solid and liquid wastes; furthermore, in order to ensure a high level of safety, most of the technological facilities have been doubled and most materials used are fireproof. The station will consist of two 3-floor buildings of polygonal section. Each of them is supported by six steel columns adjustable in height to compensate for snow pile-up at the foundation level. The two buildings have a steel structure and a double wooden wall with rock-wool insulation, facing outward. Total internal surface will be 1470 sq m, subdivided into laboratories, facilities, sleeping and living areas and storage areas. (Auth.)

G-53436

Nelson, L., **Habitability of Australian Antarctic stations,** International Design for Extreme Environment Assembly, 2nd, Montreal, Oct. 24-27, 1993. Growth and Environment: challenging extreme frontiers; IDEEA Two conference proceedings, Montreal, Canada, 1994, p.37-45, 25 refs.

It has been well recognized that living in an extreme and remote environment, under isolated and confined conditions, can have a significant impact on psychological well-being. The effect of these conditions on people living on small antarctic research stations has been documented in psychological studies conducted over the past 35 years, being the period of permanent occupation of Antarctica. Most common amongst the physical and psychological symptoms are depression, irritability, withdrawal, sleep disturbance, and cognitive and sensory impairment. So common are these symptoms that they have been labelled "winter-over syndrome". Recognizing the potential negative impact on station productivity and efficiency, the designers of the newly rebuilt Australian Antarctic Stations aimed to use the built environment to enhance the living and working conditions of expeditioners. Habitability principles were applied with the aim of creating a place where people can 'thrive and not just survive'. Features which give individuals privacy whilst encouraging social cohesiveness, provide sensory and spatial variation, and connect the interior and exterior environments were included in the design of the new stations. A project assessing the success of these designs is currently being conducted at the three Australian antarctic stations. This paper outlines the methodology of this five year project, based on questionnaires, interviews and observational studies and report preliminary data from the first two years of the study. (Auth.)

G-53438

Sheĭnsteĭn, A.S., Kotliakov, V.M., Bardin, V.I., Asadov, A.R., Krulova, N.V., **Architectural concept of Antarctic station of a new generation,** International Design for Extreme Environment Assembly, 2nd, Montreal, Oct. 24-27, 1993. Growth and Environment: challenging extreme frontiers; IDEEA Two conference proceedings, Montreal, Canada, 1994, p.53-56.

This paper describes the architectural concept of an antarctic station based on use of advanced technologies. Special emphasis has been laid on the use of energy-saving technologies. The concept has been worked out in the framework of a joint program between the Russian Committee on Antarctic Research, IDEEA Russia, and the Moscow Institute of Architects. (Auth.)

G-53440

Guichard, A., Steel, J., **Alternative energy systems for Antarctic stations: investing for the future,** International Design for Extreme Environment Assembly, 2nd, Montreal, Oct. 24-27, 1993. Growth and Environment: challenging extreme frontiers; IDEEA Two conference proceedings, Montreal, Canada, 1994, p.347-363, With French summary. 11 refs.

A French-Australian cooperative research project focusing on energy systems at antarctic research stations has been initiated. Its aims are to investigate the current energy requirements of the Australian and French stations and to conduct a feasibility study on the use of alternative energy systems. This is designed to reduce both the quantity of fuel used and the impact on the environment. The paper outlines the various issues addressed, presents the first options identified and provides a basis for identifying directions for future work. (Auth.)

G-53441

Peeran, S.M., **Performance of PV panels for solar energy conversion at the South Pole,** International Design for Extreme Environment Assembly, 2nd, Montreal, Oct. 24-27, 1993. Growth and Environment: challenging extreme frontiers; IDEEA Two conference proceedings, Montreal, Canada, 1994, p.375-391, 2 refs.

Expanding research facilities at Amundsen-Scott Station require increased electric power generation. Presently, power generation is by diesel generators using JP8 fuel. As the station is accessible only for a short period during the austral summer, there are limitations upon the supply of fuel for power generation. This makes it necessary to seriously consider the use of renewable energy sources. Although there is no sunlight for six months in the year, abundant solar energy is available during the remaining 6 months because of the clear skies, the clarity of the air and the low humidity at the South Pole. As the buildings at the South Pole are built either without windows or with only porthole type windows, large areas of the walls and roof are available for mounting photovoltaic (PV) panels. There is also unlimited space around the station for constructing a PV panel "farm". Four types of PV panels are evaluated: 2-axis tracking panels, vertical 1-axis tracking panels, fixed vertical panels on the walls of buildings and mounted outdoors and fixed horizontal panels on the roofs of the buildings. Equations are developed for the power output in kW/sq ft and annual energy in kWh/sq ft for each type of panel. The equations include the effects of the inclination of the sun above the horizon, the movement of the sun around the horizon, the direct, reflected and diffused components of the solar radiation, the characteristics of the solar cells and the types of dc/ac inverters used to interface the output of the cells with the existing ac power. A conceptual design of a 150-kW PV generation system suitable for South Pole is discussed. (Auth.)

G-53442

Sheĭnsteĭn, A.S., Shpil'raĭn, E.E., Popel', O.S., Rasgonaev, IU.V., Zaks, M.B., **Technico-economical characteristics of photovoltaics and windmills for the Antarctic inland stations,** International Design for Extreme Environment Assembly, 2nd, Montreal, Oct. 24-27, 1993. Growth and Environment: challenging extreme frontiers; IDEEA Two conference proceedings, Montreal, Canada, 1994, p.392-396, 3 refs.

This paper describes the results of a feasibility study of PV (photovoltaic), windmill and hybrid power systems with renewable energy sources for the conditions of Vostok and Oasis stations. It has been shown that the use of hybrid power systems with renewable sources of energy under the conditions of Vostok Station is now economically advantageous. (Auth. mod.)

G-53474

Klekociuk, A.R., et al, **Australian antarctic lidar facility,** *SPIE—The International Society for Optical Engineering. Proceedings,* 1994, Vol.2266, Optical Spectroscopic Techniques and Instrumentation for Atmospheric and Space Research, San Diego, California, 25-27 July, 1994. Edited by J.X. Wang and P.B. Hays, p.624-634, 19 refs.

DLC QC450.O67

A high spectral resolution lidar, under development by the Australian Antarctic Division and the University of Adelaide, is described. This instrument will be installed at Davis Station around early 1996 for the long-term measurement of atmospheric parameters as a function of altitude from the lower stratosphere to the mesopause. The siting of the lidar will allow for data comparison with existing optical, radar and balloon-borne atmospheric studies. Research utilizing the multi-instrument database will be aimed at assessing climatic variability and coupling processes throughout the atmosphere. Performance simulations for the fixed band-pass operating mode are discussed. These indicate that useful measurements of density and inferred temperature should be achievable for the mesopause region, particularly at night and during twilight. In addition, detection of clouds in the mesophere during the day appears feasible. (Auth. mod.)

G-53534

Jacobel, R.W., Anderson, S.K., Rioux, D.F., **Microprocessor based ice-radar system for surface profiling,** *Canada. Geological Survey. Paper,* 1992, No.90-4, Ground penetrating radar. Edited by J.A. Pilon, p.101-105, With French summary. 5 refs.

The authors have built a radio-echo sounder which uses a low-frequency, broadband impulse transmitter and a microprocessor-based digital recording system. The unit is mounted on skis, and power is delivered by a small generator and batteries. The receiver uses a portable digital storage oscilloscope, which passes data via a microprocessor unit to a cassette tape for offline analysis on a personal computer. Though originally intended primarily for studies on temperate ice, the sounder was tested in Antarctica during the 1987-88 field season. The system performed well there and in field tests and subsequent studies on South Cascade Glacier, WA, and a number of interesting results were obtained. An oblique incidence profile where transmitter-receiver separation varied was used to study the dielectric permittivity of the ice and to locate internal layers at shallow depths. The sounder was also deployed in conjunction with hot water drilling experiments attempting to create cavities at known locations within the ice. Waveforms from different transmitter-receiver orientations around the borehole were combined in the offline analysis to produce a more directional synthetic aperture, emphasizing returns from the borehole region. (Auth. mod.)

G-53538

Smith, P.C., Adair, R.T., Peach, D.F., **Investigation of Federal Standard 1045 high-frequency ALE radio performance in the southern trans-auroral zone,** *U.S. Department of Commerce. NTIA report series,* Mar. 1994, 94-304, 86p., 11 refs.

This report presents the results of two weeks of bi-directional high-frequency radio path soundings in a trans-auroral environment between Christchurch, New Zealand, and McMurdo Station during mid-Jan., 1992. The work was commissioned by the Naval Undersea Warfare Center, New London, CT, for the National Science Foundation. This investigation demonstrated the value of ALE adaptive radio systems as a real-time frequency management tool. Based on the results observed, the authors recommend that NSF consider the acquisition of a 1-kW ALE radio system, to be used primarily as an oblique ionospheric channel sounder with their existing communications system. This addition would provide significant improvement to the NSF frequency management capability. (Auth.)

G-53557

Argentina. Ministerio de Relaciones Exteriores, Comercio Internacional y Culto, **Fuel removal from the *Bahía Paraíso*, Dec. 1992-Jan. 1993. Final report** [Remoción de combustibles del "Bahía Paraíso", Diciembre de 1992-Enero de 1993. Informe final], Buenos Aires, 1993, 20p., In Spanish.

Details of the fuel spill of the *Bahía Paraíso* in Arthur Harbor in Jan. 1989, and of the subsequent cleaning operations undertaken jointly by Argentina and Holland, are reported. This includes description of preparations prior to the main operation, such as evaluation of environmental impact by the planned activities, mobilization of equipment and personnel, execution of the plan, and environmental concerns. Five annexes of pertinent documentation, such as agreements and contracts, conclude the report.

G-53633

Hunt, M.E., Rovang, R.D., **2.5kWe dynamic isotope power system for the space exploration initiative including an antarctic demonstration,** Space Nuclear Power Systems, 9th Symposium, Albuquerque, NM. Proceedings. Edited by M.S. El-Genk and M.D. Hoover, New York, American Institute of Physics, 1992, p.222-227, 4 refs.

DLC TL1102.N8 S95a pt.1 1992

The current focus of the Dynamic Isotope Power Systems (DIPS) Demonstration Program is a standardized 2.5-kWe portable generator for multiple applications on the Lunar or Martian surface. A variety of potential remote and mobile applications have been identified by the National Aeronautics and Space Administration (NASA). Included among these are surface rovers for both short and extended duration missions, remote power to science packages, and backup to central base power. Several power levels were investigated to determine the optimum level for the identified applications. Recent work has focused on refining the 2.5-kWe design to assure compatibility with the Martian environment while imposing only a minor mass penalty on Lunar operations. A plan and cycle schematic were generated for an early demonstration of a prototypic isotope-powered Brayton system using the Antarctic as the test bed. The plan includes a schedule and cost and a determination of the impact of such a program on the qualification of a DIPS.

G-53636

Clynch, J.R., **High latitude aspects of a differential GPS aircraft landing system,** *U.S. Naval Postgraduate School, Oceanography Department. Technical report,* July 1994, NPS-OC-94-004, 45p., ADA-290 993, 6 refs.

The use of a differential Global Positioning System (DGPS) in an aircraft landing system at high latitudes has been investigated. Both the effects of the high latitude on geometry and accuracy and the effects of scintillations on availability have been studied. Data were taken at McMurdo and South Pole stations over a two year period. It was found that commercially available systems should meet the FAA requirements for Special Category I landing systems in Antarctica. (Auth. mod.)

G-53700

Miyamoto, Y., Han, J., Hamada, E., Tanimura, A., **Development of an instrument for observing fish behavior under the sea ice using ultrasonic pinger near Syowa Station,** *Antarctic record,* Mar. 1995, 39(1), p.49-67, In Japanese with English summary. 6 refs.

This paper describes the development of hardware and software designed for observing fish behavior under the sea ice near Showa Station, during the JARE-34, 1992-94. The system consists of one master station and eight secondary stations and ultrasonic pingers. Each secondary station is composed of an ultrasonic transducer, an ultrasonic transceiver and a radio transceiver. The master station's unit consists of eight channel radio receivers, a transmitter and a 32 bit personal computer. The master unit fixes the fish 3D positions by measuring the time difference between sound reception at the secondary units. At the same time the master unit's computer displays the fish position, while recording measured time differences. Using this system, the Emerald Rock Cod *(Trematomus bernacchii)* was tracked successfully 9 times. (Auth.)

G-53704

Hanbury-Tenison, R., **Heroes of the ice,** *Geographical magazine,* Aug. 1995, 67(8), p.39.

This note recounts difficulties encountered by Scott, Mawson and Shackleton during their efforts to reach the South Pole.

G-53737

Wilson, R.P., **Foraging ecology,** Williams, T.D.: The Penguins: *Spheniscidae*; Bird families of the world, edited by C.M. Perrins, W.J. Bock, and J. Kikkawa, Oxford, UK, Oxford University Press, 1995, p.81-106, Bibliography p.264-287.

DLC QL696.S473W55 1995

A description is given of the development of electronic equipment which enables investigators to monitor penguin foraging behavior. The equipment provides data on dive depths, endurance, and patterns, all measured by devices attached to the penguins' backs. Penguin foraging locations, prey species, abundance, and consumption can be determined and impacts on the ecosystems can be assessed.

G-53745

St. John, J.W., Minnick, P.V., **Ice load impact study on the National Science Foundation's Research Vessel *Nathaniel B. Palmer*,** Washington, D.C., U.S. Coast Guard, Ship Structure Committee, 1995, 174p., USCG SSC-376, 13 refs.

This report presents the results of full-size ice impact testing done on the National Science Foundation's new research vessel, the *Nathaniel B. Palmer.* The vessel strain gauging was planned and installed during its construction, and ice impact strain recording was conducted during initial ice trials in Aug. 1992. These data were complemented by the instrumentation and measurement of the propulsion machinery performance, measurement of sea ice properties, and measurement of ship performance in open water. The results were compared to those of earlier similar studies done on the Swedish icebreaker *Oden* and the USCGC *Polar Sea.* The *Polar Sea* is of similar form to the *Palmer,* but has twice the displacement. The *Oden* has a similar displacement to the *Polar Sea*, but has a different style of icebreaking bow. By comparing the results of the three vessels the authors have provided full-scale justifications for future icebreaking design.

G-53923

Mellor, M., **Antarctic airfields,** *American Geophysical Union. Antarctic research series,* 1995, 67(4), Contributions to antarctic research IV, p.143-151, 7 refs.

DLC G845.C67 vol.67 no.4, 1995

Following a summary of recent U.S. air activities in Antarctica, aircraft runways are considered. Various airfield options from open-field landings to conventional paved runways are dealt with, the relevant factors being given in tables that cover (1) construction and maintenance and (2) operations. Bearing capacity, rutting resistance, surface roughness and runway dimensions are discussed. It is concluded that a system of hard-surface runways for conventional aircraft is technically feasible. (Auth.)

G-53924

Blaisdell, G.L., Klokov, V., Diemand, D., **Compacted snow runway technology on the Ross Ice Shelf near McMurdo, Antarctica,** *American Geophysical Union. Antarctic research series,* 1995, 67(4), Contributions to antarctic research IV, p.153-173, 14 refs.

DLC G845.C67 vol.67, no.4, 1995

The United States Antarctic Program currently operates wheeled aircraft from an annual sea-ice runway at McMurdo until about Dec. 15 each year. After that time it is limited to use of a snow runway and specialized ski-wheel aircraft. On the Ross Ice Shelf near McMurdo, runway technology is being developed to support conventional heavy wheeled aircraft. The runway capitalizes on the natural characteristics of the location and uses only snow and ice as construction materials. The runway is located inside the transition zone between the accumulation and ablation regions on the ice shelf. The first runway developed uses a thin, permanent cap of snow over natural blue ice to level undulations in the underlying surface and to protect the ice from intense solar radiation during the peak of summer (to prevent subsurface meltpool formation). The snow cap was produced by compaction with a heavy roller during the warmest part of the year; the snow was then left to sinter and strengthen with falling temperatures. In early Feb., the runway was able to support wheeled operation of a fully loaded LC-130 Hercules. (Auth.)

G-53926

DenHartog, S.L., Blaisdell, G.L., **Delivery of fuel and construction materials to Amundsen-Scott South Pole Station,** *American Geophysical Union. Antarctic research series,* 1995, 67(4), Contributions to antarctic research IV, p.197-216, 14 refs. For another source see 48-1001 or 21G-49291.

Plans are underway to rebuild Amundsen-Scott Station while maintaining the current science and operational program. The new station will require the delivery of large amounts of construction materials. None of the existing delivery systems is expected to be capable, within a reasonable time period, of supporting both current operations and the transport needs for construction of a new station. The authors have analyzed several options for moving construction materials and fuel to South Pole station. Each option assumes that goods will be transported to the antarctic continent by ship. The options include (1) construction of a snow runway at the South Pole capable of supporting wheeled aircraft, (2) development of an inland blue ice runway that is capable of supporting heavy wheeled aircraft coupled with an over-snow haulage system to the pole, (3) over-snow vehicle haulage from McMurdo to the pole, and (4) vehicle haulage from a coastal station. The results of this study are probably best used as a starting point for any serious planning and budgeting for the development of a new South Pole station. (Auth. mod.)

G-54014

Swedish Council for Building Research, **Swedish building research in Antarctica,** *Swedish Council for Building Research. Report,* 1992, D14, 14p., PB95-222477.

This document describes building construction practices at the Swedish research station Wasa in Queen Maud Land. There is also a discussion of other issues, such as waste management, water consumption, solar power and diesel fuel usage, building reliability, and environmental protection. (Auth.)

G-54036

British Antarctic Survey, **Initial environmental evaluation of the rebuilding of the research station at Signy Island, South Orkney Islands, Antarctica,** Cambridge, Natural Environmental Research Council, 1990, 34p., 18 refs.

This evaluation considers a proposal to rebuild the British Antarctic Survey station at Signy I., which involves complex issues. The first issue—the capacity of Signy I. to support scientific research at a particular level—is significant in that the answer is a principal determinant for the second issue: the size, siting and extent of the station rebuild. It is proposed that the summer accommodation capacity at Signy Station should be increased from 27 to 40. The primary questions addressed in the evaluation are the impact of an increased intensity of research on the ecosystem of Signy I. and its surrounding waters, the range and importance of the research itself and the selection of a possible site for the station. If it appears that the proposed increase in scientific activity is within the capacity of the ecosystem to sustain without permanent damage, a further, more detailed site-specific assessment of the impact on a local area of a particular range and configuration of buildings will be prepared.

See also:

A-52391 A-52395 A-53565 A-53941 B-52357 B-52358 B-52359 B-53725 B-53883 D-53138 E-53915 F-51790 F-52038 F-52941 F-53174 F-53439 F-53925 H-53183 H-54028 I-52145 I-53236 I-53644 I-53683 J-51988 K-51859 L-51765

H. MEDICAL SCIENCES

H-51723
Xue, Q.F., et al, **Survey on changes of multiple humoral factors in antarctic expedition members,** *Antarctic research,* June 1994, 5(1), p.21-26, 10 refs.

To determine physiological changes in antarctic personnel, samples from the same individual were taken and analyzed at different times: before leaving for Antarctica (A), 2 weeks after arriving at Great Wall Station (B), 12.5 months after arriving in Antarctica (C), after returning from Antarctica for a short break (D), and after returning from Antarctica for a long break (E). Results showed a significant increase of urinary noradrenaline at point (B), a decrease at point (C), and a return to normal at point (D). An increase of urinary adrenaline, plasma and urinary cortisol, also noted at point (B), remained in the subject's system long after returning from Antarctica. The significance of the findings is discussed, and possible preventive or therapeutic measures are suggested.

H-51724
Xue, Z.H., Xue, Q.F., **Psychological changes of 15 Chinese Antarctic Research Expedition members,** *Antarctic research,* June 1994, 5(1), p.27-33, 8 refs.

Eysenck Personality Questionnaire (EPQ), Behavior Pattern Questionnaire (BPQ) and Social Responses Questionnaire (SRQ) were used to study psychological changes in personnel at Zhongshan Station during winter. Also tested were memory changes and changes of their higher nervous activity flexibility. The questionnaires yielded the following results: no statistical significance was found in the score of three factions of EPQ, but significant changes happened in a few cases; the score of EPQ of type A had a tendency to drop; and subjects had a tendency to turn to external control in their locus of control. In contrast to the members' subjective feelings, memory tests showed no significant change. The flexibility of higher nervous system activity declined temporarily during polar nights, and returned rapidly to normal levels when this period ended. (Auth. mod.)

H-52096
Maki Kahn, P., Leon, G.R., **Group climate and individual functioning in an all-women antarctic expedition team,** *Environment and behavior,* Sep. 1994, 26(5), p.669-697, 27 refs.

This study focused on 4 female antarctic expedition team members who successfully skied to the South Pole in 67 days but did not meet their original objective of traversing the continent. The 3 phases of data collection included: a preexpedition personality assessment; daily self-ratings of mood, task effectiveness, stress, coping, and exertion; and postexpedition interviews about stress and coping. Personality measures showed a group high in confidence and achievement and low in bodily concern and competitiveness. Daily measures demonstrated an extremely well-functioning group with highly effective patterns of work and communication. The most commonly reported stressors were interpersonal, particularly concern about the welfare of another team member. Coping with these involved problem solving and sharing positive emotions with others. Results confirmed hypotheses that a female expedition team would be similar to male or mixed-gender teams in many respects but would be more sensitive to emotional concerns. (Auth.)

H-52278
Yu, Y.Z., Wang, Z.H., Zhang, W.C., Wu, W., **Effect of the environment in Antarctica on immune function and electroencephalogram,** *Antarctic research,* Dec. 1994, 5(2), p.45-52, 9 refs.

Observations on changes of the immune function (serum immunoglobulin, lymphocyte transformation) and electroencephalogram were carried out on members of the 8th Chinese Antarctic Research Expedition working at Zhongshan Station for a period of 12 months. Serum IgM, IgG decreased by the end of their stay to 38% of the values shown before leaving for Antarctica. Serum IgA increased at first, than returned to the original level. The lymphocyte transformation rate decreased to 45% of its original level. The low lymphocyte transformation rate lasted for 2 months after the subjects returned to Beijing. There is a close relationship between the decrease of lymphocyte transformation rate and the increase of the index and amplitude of β-band on EEG, indicating that the decrease of immunity (especially cell mediated immunity) resulted from living under stress for a long time. (Auth. mod.)

H-52692
Hobson, R.P., Williams, A., Rawal, K., Pennington, T.H., Forbes, K.J., **Incidence and spread of *Haemophilus influenzae* on an antarctic base determined using the polymerase chain reaction,** *Epidemiology and infection,* Feb. 1995, 114(1), p.93-103, 31 refs.

A PCR-based method of detecting *Haemophilus influenzae* in cultures inoculated from throat swabs was evaluated using samples from groups of laboratory staff and medical students and then applied to samples originating from the closed human community of an antarctic research station. Suitable PCR primers to an *H. influenzae* gene (ompP2) were used to amplify the gene from DNA preparations made from mixed growth on chocolate agar with added vancomycin. PCR product was reamplified and subjected to restriction endonuclease digestion to allow temporal and spatial mapping of strains over an 8-month period. Eleven different strains of *H. influenzae* were detected. One strain was detected in a third of the base members. (Auth.)

H-53183
Sullivan, P., Lugg, D.J., **Telemedicine between Australia and Antarctica: 1911-1995,** *Society of Automotive Engineers. SAE technical paper series,* 1995, No.951616, 6p., Presented at the 25th International Conference on Environmental Systems, San Diego, California, July 10-13, 1995. 15 refs.

Telemedicine, in one form or another, has long been a cornerstone of Australian antarctic medical practice. The extreme remoteness, difficulty of evacuation and inherent limitations of a sole doctor all mean that the ability to communicate with distant health professionals is extremely desirable. For many years such communication was achieved through the use of radio, but with the introduction of satellite communications to Antarctica in the 1980s a more sophisticated system became possible, with a much wider variety of applications. In spite of recent advances, written and oral communication remain the most important tools. However, the ability to transmit digital images has also proven of great value, especially in the field of radiology. (Auth.)

H-53217
Ross, J.K., Arendt, J., Horne, J., Haston, W., **Night-shift work in Antarctica: sleep characteristics and bright light treatment,** *Physiology and behavior,* June 1995, 57(6), p.1169-1174, 19 refs.

Changes in sleep parameters during and after night-shift and the effects of bright white (2500-3000 lx) and dim red (>500 lx) light treatment on re-adaptation after night-shift during winter were studied in 14 men at Halley Station. Subjects kept daily sleep diaries and mood ratings from 1 week before to 3 weeks after night-shift and received either full-spectrum white or dim red light treatment from 1100 to 1300 h daily during the first week after night-shift. Plasma melatonin and urinary 6-sulfatoxymelatonin were measured. A significant improvement in sleep was seen during night shift (latency and duration) and with bright light treatment (latency). Melatonin and aMT6s rhythms delayed by 7-8 h during night-shift. The white-light group readapted slowly, apparently by phase delay, as assessed by aMT6s measurement. The red-light group readapted slightly, but significantly faster than the white-light group. (Auth. mod.)

H-53288
Kulandaivelu, E., Singh, S., **Study of wind chill effect at Maitri,**

Antarctica, *Mausam,* Jan. 1995, 46(1), p.31-34, With Hindi summary. 4 refs.

The influence of meteorological parameters such as wind and temperature determine the chill effect upon the human body. The rate of heat removal from the body by wind and low temperature was termed as wind chill by Siple and Passel (1945). Using the wind chill chart, wind chill effects at Maitri Station during 1990 have been studied and compared with conventional value of monthly mean dry bulb and minimum temperatures. It was observed that the wind chill temperature was about 15-25°C lower than the dry bulb temperature when the wind speed exceeds 10 kt. (Auth.)

H-53535

Wortmann, H., **Medical studies of the circadian rhythm and behavior of station personnel in an antarctic research station** [Medizinische Untersuchung zur Circadianrhythmik und zum Verhalten bei Überwinteren auf einer antarktischen Forschungsstation], *Berichte zur Polarforschung,* July 1995, No.169, 261p., In German with English summary. Refs. p.207-223. Report is based on the author's dissertation presented to the Faculty of Medizin at the University of Hamburg in Feb. 1994.

The aim of the present research project was to find out how different daylight conditions in the Antarctic affect human circadian rhythms in the course of a year. Furthermore, it was deemed useful to investigate whether social isolation in Antarctica causes a strain that influences behavior. Five men overwintering at Neumayer Station participated in the test program. Data on sleeping and working behavior were collected by means of a time/budget study and data concerning the circadian rhythm of body temperature, tiredness, and "Befindlichkeit" (subjective feeling according to the list of adjectives EWL-N by Janke and Debus, 1978) were collected in daily profiles. Significant changes in work and sleep habits and the "Befindlichkeit" prove the effect of the change of bright light and darkness as a synchronizer for human circadian rhythms, although the "dark period" continued for a longer period than just the polar night and the weeks of particularly short daylight. (Auth. mod.)

H-53592

Soroko, S.I., Sidorov, IU.A., Nalbandian, L.A., Matveeva, T.S., Koriukin, V.M., Golovin, V.N., **Characteristics of acute high-altitude sickness in Antarctica** [Osobennosti techeniia ostroĭ gornoĭ bolezni v usloviiakh Antarktidy], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1992, Vol.88, p.82-91, In Russian. 15 refs.

The occurrence of acute hypoxia found in men working in antarctic mountains is discussed. Physiological and chemical changes of the brain found in affected expeditioners are described and results of tests are shown on charts. It is stressed that to prevent high-altitude disorders, it is important to determine the degree of oxygen deficiency at antarctic stations located higher than 2000 m above sea level.

H-53593

Matusov, A.L., **Morbidity of wintering-over participants in Soviet antarctic expeditions of 1981-1985** [Zabolevaemost' uchastnikov zimovochnogo sostava Sovetskikh antarkticheskikh ekspeditsiĭ v 1981-1985 gg.], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1992, Vol.88, p.92-109, In Russian. 3 refs.

Investigations of relative incidence of disease in wintering-over SAE personnel are reported. Results are discussed and presented in tables showing the number of people affected during each of 5 expeditions (26th-30th), their line of work, type of disease, its duration, the Soviet station on which it occurred, and duration of therapy (in days). A link is found between morbidity of the expeditioners and the type of their occupation.

H-53624

Muller, H.K., Lugg, D.J., Quinn, D., **Cell mediated immunity in antarctic wintering personnel; 1984-1992,** *Immunology and cell biology,* Aug. 1995, 73(4), p.316-320, 21 refs.

Cell-mediated immune responses were studied in 12 antarctic and subantarctic wintering groups at quarterly intervals over the period 1984-1992, using the cutaneous CMI Multitest. These populations are among the most isolated on earth. While the subantarctic population at Macquarie I. had levels of responsiveness and hypoergy (9%) comparable to healthy populations in temperate zones, the antarctic continental group showed a level of hypoergy of 36%. There was no seasonal variation in the pattern of responses. It is concluded that the extreme and isolated environment and stress factors are responsible for the decreased immunological responsiveness, but the mechanisms are presently unclear. One factor appears to be perceived anxiety. The high rate of hypoergy in Antarctica, where medical care is limited, may have health implications. These groups provide an excellent analog for immunological investigations in long-term space flight. (Auth.)

H-53680

Steel, G.D., Suedfeld, P., Palinkas, L.A., **People and place: the antarctic environmental relationship,** *Antarctic journal of the United States,* 1993, 28(5), p.341, 3 refs.

Building on prior research into personality factors of the polar sojourner and extending an interpersonal relationship model forwarded by Sternberg (1986, 1988), an "environmental relationship" model was tested during the 1992 austral summer. Using a newly developed interview technique, this model examined three factors thought to underpin the environmental relationship: passion for a place, environmental intimacy (trust, depth of knowledge, self-identity), and commitment to the site. Preliminary results indicate that all three factors are present, in varying degrees, in Antarcticans' relationship with their worksite.

H-53865

Spinney, L., **Did antarctic exploreres starve to death,** *New scientist,* Sep. 23, 1995, 147(1996), p.10.

This note records the conclusion that the members of the 1912 Scott Expedition to the South Pole perished due to starvation. This inference derives from the recent expedition of Fiennes and Stroud in which the explorers conducted detailed metabolic and other physiological tests which indicated that their daily caloric consumption exceeded by an appreciable amount that recorded for the members of the Scott Expedition, whose reliance on protein- rather than fat-based foodstuffs dictated heavier freight loads and required higher freight-hauling metabolic output then the more efficient loads of the recent expeditioners.

H-53990

Muller, H.K., Lugg, D.J., Ursin, H., Quinn, D., Donovan, K., **Immune responses during an antarctic summer,** *Pathology,* 1995, 27(2), p.186-190, 17 refs.

ANARE expedition personnel investigated showed decreased cell mediated immune responses (CMI) assessed by the CMI Multi-test; 21% were hypoergic. The major associated observation was a significant negative correlation with anxiety in Antarctica. However, perceived anxiety was greater before and after the voyage. No significant changes were found in T and B lymphocyte subsets, immunoglobulin and complement components and cutaneous blood flow, nor was there any clinical evidence of illness. Of the hormones examined only cortisol was low predeparture, which may reflect increased perceived anxiety at that time. Changes in immune control mechanism were apparent as shown by reduced CMI responses and lowered tetanus antibody levels. Stress factors are postulated to induce depression of the immune response in Antarctica. The association with anxiety suggests that brain peptides or associated cytokines may have a role in mediating these immune events. Such alterations in immune status have implications for health management in isolated and extreme conditions. (Auth. mod.)

H-53991

Palinkas, L.A., Cravalho, M., Browner, D., **Seasonal variation of depressive symptoms in Antarctica,** *Acta psychiatrica scandinavica,* 1995, 91(6), p.423-429, 30 refs.

Symptom characteristics and risk factors for seasonal variation in depressive symptoms were prospectively examined in 119 men and women who overwintered in Antarctica in 1989. Over a 12-month period, this cohort reported significant increases in their global depressive symptom scores as well as several individual symptoms associated with winter depression. Summer depression and marital status were significant independent predictors of winter depression. Factor analyses of summer and winter symptoms revealed a set of symptoms traditionally associated with the winter-over experience in a distinct factor not found in summer. These results indicate that even asymptomatic, clinically normal populations experience seasonal variation in mood in high-latitude environments. However, this seasonal variation may be the result of social isolation during the winter months rather than the prolonged absence of sunlight. (Auth.)

H-54028

New Zealand. Ministry of Foreign Affairs and Trade. NZAP,
New Zealand Antarctic Programme. First aid and field manual, Christchurch, 1995, 202p.

This manual, designed to help expeditioners to function safely in the antarctic environment, contains essential information on first aid for a wide variety of trauma, including accidents, EAR/CPR, shock, cold injuries, burns, etc.. It also serves as guidance to antarctic field events, covering field travel, flying, surface transport, field organization and camping, search and rescue, refuge huts, field communications and clothing tips.

See also:
A-51777 B-52012 B-52249 B-52250 B-52251 B-52357 B-52627
B-52819 B-53938 G-51698 G-52370 G-52611 G-53436 G-53704

I. METEOROLOGY

I-51702

Smith, S.R., Teeuwisse, S., **Whiteout!**, *Weatherwise,* Oct.-Nov. 1994, 47(5), p.54,50.

This article recounts the authors' experience with blizzard conditions encountered on 12 Nov. 1992 at South Camp, a temporary summer camp established on Siple Coast, 600 miles from McMurdo, and funded by the National Science Foundation. The research objective of the camp was the study of the atmospheric boundary layer. The author attributes the severity of the blizzard to the rapid decrease of atmospheric pressure early within the mesocyclonic development, thought to represent the first example of such a storm recorded within the antarctic interior.

I-51705

Pollard, D., Thompson, S.L., **Sea-ice dynamics and CO_2 sensitivity in a global climate model,** *Atmosphere-ocean,* June 1994, 32(2), p.449-467, With French summary. 49 refs.

Present-day results and CO_2 sensitivity are described for two versions of a global climate model with and without sea-ice dynamics. Sea-ice dynamics is modelled using the cavitating-fluid method of Flato and Hibler (1990, 1992). The atmospheric general circulation model originated from the National Center for Atmospheric Research (NCAR) Community Climate Model version 1, but is heavily modified to include new treatments of clouds, penetrative convection, planetary boundary-layer mixing, solar radiation, the diurnal cycle and the semi-Lagrangian transport of water vapor. The surface models include an explicit model of vegetation, multilayer models of soil, snow and sea ice, and a slab ocean mixed layer. When sea-ice dynamics is turned off, the CO_2-induced warming increased drastically around 60-80S in winter and spring. This is due to the much greater (and unrealistic) compactness of the antarctic ice cover without dynamics, which is reduced considerably when CO_2 is doubled and exposes more open ocean to the atmosphere. With dynamics, the winter ice is already quite dispersed for 1 x CO_2 so that its compactness does not decrease as much when CO_2 is doubled. (Auth. mod.)

I-51708

Bian, L.G., et al, **Surface meteorological data at Zhongshan Station, Antarctica 1989-1992,** *CHINARE data report,* Mar. 1994, No.7, 203p.

This meteorological report contains tables with monthly and daily summaries, and surface synoptic data, recorded at the Zhongshan Station from Mar. 1989 to Dec. 1992, with a brief description of instruments and methods used and a list of notations used in the tables.

I-51709

Bian, L.G., et al, **Surface meteorological data at Great Wall Station, Antarctica 1988-1992,** *CHINARE data report,* Dec. 1993, No.6, 263p.

This meteorological report contains tables with monthly and daily summaries, and surface synoptic data, recorded at the Great Wall Station from Jan. 1988 to Dec. 1992, with a brief description of instruments and methods used and a list of notations used in the tables.

I-51739

Bruner, F., Mangani, F., Maione, M., **Measurements of CFCs in Antarctica,** *Environmental monitoring and assessment,* 1994, Vol.31, p.219-224, 9 refs.

Many difficulties are encountered when measuring atmospheric concentration of CFCs. This is because very low concentrations have to be detected with a high degree of accuracy, since even slight differences may have a big effect on the diffusion models elaborated to forecast the migration time to the stratosphere. Furthermore, atmospheric concentrations of the different halocarbons range from few ppts (for F114) to about 500 ppts (for F12), and the response of the electron capture detector (ECD) to the various compounds is extremely different. There are several methodologies for collecting air samples and for analyzing them. The one used by the authors makes use of subambient temperature sampling using traps containing graphitized carbon black as an adsorbent. Samples are analyzed in a gas chromatograph coupled with a high resolution mass spectrometer (GC-HRMS) used in the selected ion monitoring (SIM) mode. This methodology allows the analysis of many compounds in the same sample and yields a more effective peak identification with respect to EC detection. Permeation tubes are used to calibrate; these are the most reliable calibration devices when volatile compounds on the order of ppts have to be analyzed. (Auth. mod.)

I-51774

Carrasco, J.F., Bromwich, D.H., **Climatological aspects of mesoscale cyclogenesis over the Ross Sea and Ross Ice Shelf regions of Antarctica,** *Monthly weather review,* Nov. 1994, 122(11), p.2405-2425, Refs. p.2424-2425.

A one-year (1988) statistical study of mesoscale cyclogenesis near Terra Nova Bay and Byrd Glacier was conducted using high-resolution digital satellite imagery and automatic weather station data. The satellite survey of mesoscale vortices was extended over the Ross Sea and Ross Ice Shelf. Results suggest southern Marie Byrd Land as another area of mesoscale cyclone formation. The average large-scale pattern associated with cyclogenesis days near Terra Nova Bay suggests a slight decrease in the sea-level pressure and 500-hPa geopotential height to the northwest of this area with respect to the annual average. This may be an indication of the average position of synoptic-scale cyclones entering the Ross Sea region. Comparison with a similar study for 1984-85 shows that the overall mesoscale cyclogenesis activity was similar during the three years, but 1985 was found to be the year with greater occurrence of "significant" mesoscale cyclones. The large-scale pattern indicates that this greater activity is related to a deeper circumpolar trough and 500-hPa polar vortex for 1985 in comparison to 1984 and 1988. (Auth. mod.)

I-51823

Streten, N.A., **Antarctic operational meteorology: past, present and future,** *World Meteorological Organization. WMO bulletin,* Apr. 1992, 41(2), p.145-154, 10 refs.

The history of antarctic meteorological data analysis and publication, from the beginning of the 20th century to current meteorological analysis centers, is briefly reviewed. The basic surface observational network of manned stations, which has not changed greatly since the IGY, as well as the development and function of automatic weather stations and buoys, are described and their distribution is shown. Data availability, analysis and transmission are discussed.

I-51824

Baker, M., **Development of international co-operative studies of polar meteorology,** *World Meteorological Organization. WMO bulletin,* Apr. 1992, 41(2), p.165-170, 4 refs.

The attempts of individuals and nations to promote antarctic international studies in meteorology and geophysics from as early as the mid-19th century, and how they finally came to fruition, are reviewed. Methods and instruments used in this international effort to obtain reliable meteorological data in Antarctica, including the events of the Second International Polar Year 1932-1933 and the International Geophysical Year 1957-1958, are discussed.

I-51825

Bojkov, R.D., **Changes in polar ozone,** *World Meteorological Organization. WMO bulletin,* Apr. 1992, 41(2), p.171-180.

After an introductory review of the discovery of ozone depletion, the ozone scientific background, its mechanics and regime in polar regions, relation to lower stratosphere temperature and its long-term trends, are discussed. After describing the polar stratospheric chemistry, the author predicts that the appearance and duration of the ozone decline in high latitudes, and its intensity over the middle latitudes, will be prolonged and more significant than heretofore.

I-51836

Song, N.H., **Freezing temperatures of $H_2SO_4/HNO_3/H_2O$ mixtures: implications for polar stratospheric clouds,** *Geophysical research letters,* Dec. 1, 1994, 21(24), p.2709-2712, 14 refs.

The freezing temperatures of $H_2SO_4/HNO_3/H_2O$ mixtures were systematically documented. Nitric acid was found to affect freezing significantly. Measurements show that nitric acid can cause substantial supercooling over a broad composition range. However, some ternary compositions, like those in polar stratospheric clouds (PSCs), have high freezing temperatures. The freezing of PSC particles could be controlled by the temperature and vapor pressure of both nitric acid and water in a nonlinear way. Formation of polar stratospheric clouds may be forecast on the basis of conditions of temperature and vapor contents of water and nitric acid. (Auth.)

I-51837

Tzeng, R.Y., Bromwich, D.H., Parish, T.R., Chen, B., **NCAR CCM2 simulation of the modern antarctic climate,** *Journal of geophysical research,* Nov. 20, 1994, 99(D11), p.23,131-23,148, 53 refs.

The National Center for Atmospheric Research community climate model version 2 (CCM2) simulation of the circumpolar trough, surface air temperature, the polar vortex, cloudiness, winds, and atmospheric moisture and energy budgets are examined to validate the model's representation of the present-day antarctic climate. The results show that while the CCM2 can well simulate many important climate features over Antarctica, there are also some serious errors in the model. The model errors over high southern latitudes can be summarized as follows: the circumpolar trough, the polar vortex, and the westerlies in mid-latitudes are too strong; the semiannual cycle of the circumpolar trough is distorted compared to observations; the low centers of the circumpolar trough and the troughs in the middle and upper troposphere are shifted eastward by 15-40 deg longitude; the surface temperatures are too cold over the plateau in summer and over the coastline in winter; the polar tropopause continues to have a cold bias; and the cloudiness is too high over the continent. These biases are induced by two major factors: (1) the cloud optical properties in tropical and middle latitudes, and (2) the cold bias of the surface air temperature. Although the simulated antarctic climate still suffers these biases, the overall performance of the CCM2 is much better than that of the CCM1-T42. (Auth. mod.)

I-51838

Tape, W., **Atmospheric halos,** *American Geophysical Union. Antarctic research series,* 1994, Vol.64, 143p., 44 refs.

Halos are caused by the refraction and reflection of sunlight in prismatic ice crystals in the atmosphere. The most common halos are parhelia (two bright spots about 22 degrees on either side of the sun) and circumzenith arcs (a rainbow colored arc with its center at the zenith about 46 degrees above the sun), usually produced by plate crystals, and tangent arcs (halos tangent to other halos), usually produced by column crystals. It is suggested that randomly oriented crystals may produce complete circular halos around the sun at 22 and 46 degrees. Ray paths for various crystal shapes and orientations are described and numerous photographs of halos and representative ice crystals are provided, mostly from Alaska, Wisconsin, and Antarctica, with some of the best examples from Antarctica.

I-51846

Flower, D.A., Froidevaux, L., Jarnot, R.F., Read, W.G., Waters, J.W., **UARS Microwave Limb Sounder observations of upper atmosphere ozone and chlorine monoxide,** International Geoscience and Remote Sensing Symposium, Pasadena, CA, Aug. 8-12, 1994. Proceedings, Vol.2, Piscataway, NJ, Institute of Electrical and Electronics Engineers, Inc., 1994, p.1115-1117, 8 refs.

Upper Atmospheric Research Satellite Microwave Limb Sounder (UARS MLS) observations of stratospheric ozone and chlorine monoxide are described. Enhanced concentrations of ClO, the predominant form of reactive chlorine responsible for ozone depletion, are seen within both the northern and southern winter polar vortices. In the Southern Hemisphere, this leads directly to the development of the annual antarctic ozone hole. While ozone depletion is also observed in the north, it is less severe and there is considerable interannual variability. (Auth. mod.)

I-51848

De Zafra, R.L., Trimble, C., Reeves, J.M., Cheng, D., Shindell, D.T., **mm-wave spectroscopy of stratospheric trace gases at the South Pole over an 11-month cycle: O_3, N_2O, HNO_3, NO_2, and ClO,** International Geoscience and Remote Sensing Symposium, Pasadena, CA, Aug. 8-12, 1994. Proceedings, Vol.3, Piscataway, NJ, Institute of Electrical and Electronics Engineers, Inc., 1994, p.1678-1680, 9 refs.

A ground-based, cryogenically cooled tunable heterodyne spectrometer operating near 275 GHz (1.1 mm) was employed to make frequent quantitative measurements of various trace gases at Amundsen-Scott Station over an 11 month period starting in Feb. 1993. The detector is a high frequency Schottky diode cooled to 20 K. Here is presented an overview of the data collected by this system for O_3, N_2O, NO_2, HNO_3, and ClO in the polar vortex. Vertical profiles of the chosen trace gases are affected variously by gas-phase chemistry, heterogeneous chemistry on particle surfaces, condensation, photochemistry, and transport. A unique record has been obtained from which the dynamical development of the antarctic winter vortex, the extent and influence of downward transport in the mesosphere and stratosphere, the timing of polar stratospheric cloud formation, and the onset and duration of ozone destruction by chlorine photochemistry can all be obtained. (Auth. mod.)

I-51849

Emmons, L.K., De Zafra, R.L., **Accuracy of profile retrievals from mm-wave spectra of ClO and N_2O,** International Geoscience and Remote Sensing Symposium, Pasadena, CA, Aug. 8-12, 1994. Proceedings, Vol.3, Piscataway, NJ, Institute of Electrical and Electronics Engineers, Inc., 1994, p.1684-1686, 5 refs.

The accuracy of a Chahine-Twomey retrieval algorithm, acting on pressure-broadened mm-wave rotational spectra measured with ground-based equipment, is explored for two radically different profiles. The first represents a two-layered antarctic ClO distribution having a maximum mixing ratio of ca. 1.5 ppbv and no tropospheric component, and the second represents a typical polar N_2O profile, with a tropospheric mixing ratio of 300 ppbv dropping rapidly in the low- to mid-stratosphere. The uncertainties or errors due to intrinsic retrieval limits, practical levels of random noise, uncertainties in input parameters (atmospheric temperature and pressure profiles, pressure broadening), and in calibration of instrument sensitivity are all explored; an overall error budget is established as a function of altitude. (Auth. mod.)

I-51852

Basili, P., et al, **Simulation study of a microwave radiometric temperature profiler for the antarctic atmosphere,** International Geoscience and Remote Sensing Symposium, Pasadena, CA, Aug. 8-12, 1994. Proceedings, Vol.4, Piscataway, NJ, Institute of Electrical and Electronics Engineers, Inc., 1994, p.2436-2438, 7 refs.

This paper describes a simulation study carried out by applying the radiative transfer equation to a database of radiosoundings released from the Dumont d'Urville Station, located in the proximity of the eastern coasts of Antarctica. This study was conducted for defining the specifications of the radiometric channels and for assessing an inversion algorithm for temperature profile retrieval, suitable for the foreseen operational mode of continuously working ground-based microwave radiometer observation of the antarctic atmosphere. (Auth. mod.)

I-51855

Molina, M.J., **Probable role of stratospheric 'ice' clouds: heterogeneous chemistry of the 'ozone hole',** Chemistry for the 21st Century Monograph. Chemistry of the atmosphere: its impact on global change, London, International Union of Pure and Applied Chemistry, 1994, p.27-38, 43 refs.

Chemical reactions occurring on the surfaces of polar stratospheric cloud (PSC) particles are now recognized to be an essential component of the chlorofluorocarbon (CFC)-induced polar ozone-depletion mechanism. The most important of these 'heterogeneous' reactions transforms the two most abundant inert reservoirs of chlorine (HCl and $ClONO_2$) into Cl_2, which photolyses readily to yield active chlorine. There are two important types of PSC: type I consists of nitric acid trihydrate (NAT) crystals, which form at temperatures several degrees above the frost point of water; type II consists of water-ice crystals. This paper considers some physical chemistry aspects of these heterogeneous reactions, focusing on two points: the nature of the interaction of HCl vapor with ice and NAT, and the nature of 'water-rich' and 'nitric acid-rich' NAT. (Auth. mod.)

I-51869

Toon, O.B., Tolbert, M.A., Koehler, B.G., Middlebrook, A.M., Jordan, J., **Infrared optical constants of H_2O ice, amorphous nitric acid solutions, and nitric acid hydrates,** *Journal of geophysical research,* Dec. 20, 1994, 99(D12), p.25,631-25,654, 24 refs.

This paper presents a determination of the infrared optical constants of nitric acid trihydrate, nitric acid dihydrate, nitric acid monohydrate, and solid amorphous nitric acid solutions which crystallize to form these hydrates. Included are the infrared optical constants of H_2O ice. The transmission of infrared light was measured through thin films of varying thickness over the frequency range from about 7000 to 500/cm at temperatures below 200 K. A theory was developed for the transmission of light through a substrate that has thin films on both sides. An iterative Kramers-Kronig technique was used to determine the optical constants which give the best match between measured transmission spectra and those calculated for a variety of films of different thickness. These optical constants should be useful for calculations of the infrared spectrum of polar stratospheric clouds. (Auth. mod.)

I-51870

Middlebrook, A.M., Berland, B.S., George, S.M., Tolbert, M.A., Toon, O.B., **Real refractive indices of infrared-characterized nitric-acid/ice films: implications for optical measurements of polar stratospheric clouds,** *Journal of geophysical research,* Dec. 20, 1994, 99(D12), p.25,655-25,666, 48 refs.

The infrared spectra of nitric-acid/ice films representative of polar stratospheric clouds (PSCs) were collected with simultaneous optical interference measurements to determine the real refractive indices at $\in$=632 nm. Ice and amorphous nitric-acid/ice films were prepared by condensation of water and nitric acid vapors onto a wedged Al_2O_3 substrate. The real refractive indices of these films were determined from the optical interference of a reflected helium-neon laser during film growth. The indices of the amorphous films varied smoothly from n=1.30 for ice to n=1.49 for nitric acid, similar to observations in previous work. During desorption, the refractive indices for ice, NAM (nitric acid monohydrate), α- and β-NAT (nitric acid trihydrate) films were measured using the optical interference technique. In agreement with earlier data, the real refractive indices for ice and NAM determined in desorption were $n=1.30\pm0.01$ and $n=1.53\pm0.03$, respectively. (Auth. mod.)

I-51871

Danilin, M.Y., McConnell, J.C., **Heterogeneous reactions in a stratospheric box model: a sensitivity study,** *Journal of geophysical research,* Dec. 20, 1994, 99(D12), p.25,681-25,696, 63 refs.

A chemical module prepared for a three-dimensional global chemistry transport model and a general circulation model has been used to carry out a sensitivity study of the effects of heterogeneous reactions on/in the sulfate aerosol and on polar stratospheric cloud (PSC) particles. Presented here are results for the latitudes 60S, 70S and 75S at the 50-mbar level. Findings indicate that (1) the new values of the HNO_3 cross sections result in lower mixing ratios for NO_x and make ozone more vulnerable to catalytic destruction by ClO_x; (2) the effect of the heterogeneous reactions $OH+HNO_3(a)$ to H_2+NO_3 and $HO_2+HO_2(a)$ to $H_2O_2+O_2$ are small in comparison with the same gas phase reactions and play a negligible role in the ozone balance; (3) the HCl reactions in the sulfuric acid aerosol at 60S and 70S increase the chlorine activation up to 0.53 parts per billion by volume (ppbv) and 0.72 ppbv, respectively, for liquid aerosol and up to 0.87 ppbv for frozen aerosol at 70S for volcanic conditions, which results in considerable ozone depletion at these latitudes; (4) concerning the ozone "hole" phenomenon, the authors consider the different initial ratios of $ClONO_2$/HCl, of N_2O_5, galactic cosmic rays, and longer lifetimes for the PSC. (Auth. mod.)

I-51872

Shindell, D.T., Reeves, J.M., Emmons, L.K., De Zafra, R.L., **Arctic chlorine monoxide observations during spring 1993 over Thule, Greenland, and implications for ozone depletion,** *Journal of geophysical research,* Dec. 20, 1994, 99(D12), p.25,697-25,704, 19 refs.

This paper presents data concerning the vertical distribution of chlorine monoxide (ClO), from measurements of pressure-broadened molecular-emission spectra made over Thule, Greenland during the 1993 arctic spring. The measurements show a weak lower stratospheric layer of chlorine monoxide inside the vortex in late Feb., which was, however, significantly greater in mixing ratio than that observed in spring 1992. ClO was also observed in much smaller quantities in early to mid-Mar. 1993 when Thule was outside the vortex. The amount of ClO within the vortex was severely reduced by the time it returned over Thule in late Mar. This reduction occurred several weeks earlier relative to the winter solstice than the decline of ClO inside the antarctic vortex in 1993. The enhanced arctic lower stratospheric layer seen in late Feb. 1993 had a peak mixing ratio of about 0.5 parts per billion by volume (ppbv), nearly a factor of 3 smaller than that observed in the Antarctic in 1993 at a nearly equivalent photochemical period. (Auth. mod.)

I-51883

Schneider, W., Yamanouchi, T., Watanabe, O., Nishio, F., Masuko, H., **Classification of MOS-1 VTIR images in the Antarctic, a case study,** *International journal of remote sensing,* Dec. 1994, 15(18), p.3675-3691, 21 refs.

Several procedures are described for the automatic processing of data from the visible and thermal infrared radiometers of the MOS-1 satellite during passes over the Antarctic. Under sunlight conditions it is possible to distinguish automatically between cloud free and cloudy surfaces by applying thresholds to the albedo, the brightness temperature and to the degree of homogeneity. Among the cloudy surfaces, stratus clouds above the antarctic continent are identified. The remaining clouds are classified according to their brightness temperatures and albedos. (Auth. mod.)

I-51977

Roos, P., Holm, E., Persson, R.B.R., Aarkrog, A., Nielsen, S.P., **Deposition of ^{210}Pb, ^{137}Cs, $^{239+240}$Pu, and ^{241}Am in the Antarctic Peninsula area,** *Journal of environmental radioactivity,* 1994, 24(3), p.235-251, 17 refs.

^{210}Pb, ^{137}Cs, $^{239+240}$Pu, ^{238}Pu, and ^{241}Am were analyzed in lichen, moss, grass and soil samples, as well as in lake sediments from the South Shetland Is. in order to evaluate the flux and deposition of these elements. Average inventories of the analyzed radionuclides in 1988 are listed. A significant difference in ^{137}Cs/$^{239+240}$Pu ratios between lichens and moss/grass/soil is observed which may be an effect of submerging and melt-water altering radionuclide ratios. From one of three lakes studied it is possible to perform ^{210}Pb dating with reasonable accuracy, showing an average annual sediment accumulation in this lake of about 45 g/m^2. (Auth.)

I-51985

Konishi, H., Wada, W., Endoh, T., **Seasonal variation of precipitating clouds near Syowa Station, Antarctica derived from liquid water content data,** *Meteorological Society of Japan. Journal,* Oct. 1994, 72(5), p.709-717, With Japanese summary. 15 refs.

Snow clouds were observed by vertically-pointing radar and microwave radiometer at Showa Station in 1989 to measure vertically integrated ice water content (IWC) and liquid water content (LWC) in the clouds. Most of the water-rich clouds appeared in autumn when the area of sea ice was at its annual minimum. On the other hand, the water-poor clouds appeared in almost all seasons, especially frequently in winter and early spring when the sea ice area was at its annual maximum. The occurrence frequency of these clouds seems to correlate with the area of sea ice rather than with air temperature. The convective activity to produce supercooled water droplets becomes suppressed during their passage above the sea ice with less water vapor supplied from the sea. There was a difference in the amount and area of snowfall among the clouds. The water-rich clouds brought much more snowfall within 50 km of the coastline than the water-poor clouds. This localization of snowfall would stem from the orographic effect caused by production of water condensate in clouds due to lifting of air along the slope of the continent. The water-poor clouds brought less condensed water after lifting. (Auth. mod.)

I-51986

Kotliakov, V.M., Lorius, C., **Climate of the penultimate ice age: a study of an antarctic ice core,** *Polar geography and geology,* Apr.-June 1994, 18(2), p.103-120, Translated from Izvestiia Akademii nauk, Seriia geograficheskaia, 1993, No.4. 23 refs.

Climatic conditions of the penultimate ice age are analyzed on the basis of isotopic-geochemical analyses of an ice core from the Vostok research station. Data from the core, which includes material from as deep as 2546 m, permit the compilation of a chronology of glacial sediments and determination of time changes in air temperature and in gas composition of the former atmosphere. It also provides the basis for comparisons with information derived from oceanic cores. This allows interpretation of past climates in East Antarctica as far back as 200,000 years B.P., indicating that a long cold period similar to the last ice age occurred in the region from 220,000-140,000 years B.P.

I-51989

Dowsett, H., et al, **Joint investigations of the Middle Pliocene climate. I: PRISM paleoenvironmental reconstructions,** *Global and planetary change,* Dec. 1994, 9(3-4), p.169-195, Refs. p.191-195.

Analysis of middle Pliocene (ca. 3 MA) marine and terrestrial records throughout the Northern Hemisphere forms the basis of an integrated synoptic Pliocene paleoclimate reconstruction of the last significantly warmer than present interval in Earth history. This reconstruction, developed primarily from paleontological data, includes middle Pliocene sea level, vegetation, land-ice distribution, sea-ice distribution, and sea-surface temperature. These data indicate that middle Pliocene sea level was at least 25 m higher than present, presumably due in large part to a reduction in the size of the East Antarctic Ice Sheet. Sea surface temperatures were essentially equivalent to modern temperatures in tropical regions but were significantly warmer at higher latitudes. Due to increased heat flux to high latitudes, both the Arctic and Antarctic appear to have been seasonally ice free during the middle Pliocene with greatly reduced sea ice extent relative to today during winter. Vegetation changes, while more complex, are generally consistent with marine SST changes and show increased warmth and moisture at higher latitudes during the middle Pliocene. (Auth. mod.)

I-52032

Rummukainen, M., Knudsen, B., Von der Gathen, P., **Dynamical diagnostics of the edges of the polar vortices,** *Annales geophysicae,* Nov. 1994, 12(10/11), p.1114-1118, 9 refs.

In this work, the authors define the edges of the polar vortices during one antarctic and two arctic winters on two stratospheric levels with the help of ECMWF global initialized analysis fields. Their definition of a polar vortex is based on isentropic total wind maxima at successive 1.5° longitude bins encircling the respective pole. A retrieval of the isentropic PV values along the diagnosed vortex edges permits them to subsequently perform a quantitative comparison between vortex edge defined by the total wind maxima, and the variability of isentropic PV values there. It appears that one is able to assign discrete ranges of PV for diagnosing the edges of the polar vortices. However, such ranges exhibit variability on time scales longer than a few months, as well as between individual winters. This should be taken into account when using PV in the interpretation of experimental data. (Auth. mod.)

I-52037

Santee, M.L., et al, **Interhemispheric differences in polar stratospheric HNO_3, H_2O, ClO, and O_3,** *Science,* Feb. 10, 1995, 267(5199), p.849-852, 41 refs.

Simultaneous global measurements of nitric acid (HNO_3), water (H_2O), chlorine monoxide (ClO), and ozone (O_3) in the stratosphere have been obtained over complete annual cycles in both hemispheres by the Microwave Limb Sounder on the Upper Atmosphere Research Satellite. A sizeable decrease in gas-phase HNO_3 was evident in the lower stratospheric vortex over Antarctica by early June 1992, followed by a significant reduction in gas-phase H_2O after mid-July. By mid-Aug., near the time of peak ClO, abundances of gas-phase HNO_3 and H_2O were extremely low. The concentrations of HNO_3 and H_2O over Antarctica remained depressed into Nov., well after temperatures in the lower stratosphere had risen above the evaporation threshold for polar stratospheric clouds, implying that denitrification and dehydration had occurred. No large decreases in either gas-phase HNO_3 or H_2O were observed in the 1992-1993 arctic winter vortex. Although ClO was enhanced over the Arctic as it was over the Antarctic, arctic O_3 depletion was substantially smaller than that over Antarctica. A major factor currently limiting the formation of an arctic ozone "hole" is the lack of denitrification in the northern polar vortex, but future cooling of the lower stratosphere could lead to more intense denitrification and consequently larger losses of arctic ozone. (Auth.)

I-52041

Monin, A.S., **Contribution to the theory of glacial periods,** *Russian Academy of Sciences. Transactions. Earth science sections,* Oct. 1994, 327(8), p.30-35, 10 refs. For Russian original see 49-1370.

The theory presented in this paper considers, three processes: 1) the occurrence of global cooling epochs caused by continental drift and pole wanderings, which projected large areas of the continents into circumpolar regions; 2) the quasiperiodic generation of continental ice sheets in the circumpolar regions during such cold epochs because of fluctuations in the latitudinal insolation distribution in response to perturbations of the earth's orbit around the sun, as well as of the inclination of the earth's equator to the plane of that orbit, induced by the gravity of other planets (Milankovitch's astronomical theory); and 3) rapid ice-sheet breakup because of the subsidence of continents into the viscous asthenosphere under the weight of such sheets. (Auth. mod.)

I-52042

Frederick, J.E., Diaz, S.B., Smolskaia, I., Esposito, W., Lucas, T.B., Booth, C.R., **Ultraviolet solar radiation in the high latitudes of South America,** *Photochemistry and photobiology,* Oct. 1994, 60(4), p.356-362, 23 refs.

Measurements of the ultraviolet (UV) solar irradiance are available from Ushuaia, Tierra del Fuego during the spring and summer seasons of 4 consecutive years beginning in 1989. In addition, column ozone amounts derived from satellite-based measurements exist for this location over the entire period from 1980 through 1991. Monthly mean column ozone over Ushuaia shows a general decline over the observing period, and a large day-to-day variability exists within a given month. Ozone amounts for the years 1980 through 1986 combined with a model of radiative transfer provide a climatological baseline against which to interpret the more recent ground-based irradiance data. Monthly mean noontime irradiances are intergrated over 5 nm-wide spectral bands near 305 nm and 340 nm, respectively. Measurements in the 340 nm band show that cloudiness has a large influence on both the absolute monthly mean irradiances and their interannual variability. For example, during Dec. the 340 nm band irradiance varied from approximately 50% of the clear-sky value in 1992 to 65% in 1991. When the influence of cloudiness is removed, most of the months show irradiances in the 305 nm band that are larger than predicted from the climatological ozone amounts. The largest percentage enhancement occurred in Oct. 1991 when the irradiance exceeded the baseline by 56%. The largest absolute irradiances occur in Dec., where the measurements range from 5.8% below the baseline in 1991 to 31% above in 1990. (Auth. mod.)

I-52052

Radionov, V.F., Marshunova, M.S., **Decrease in atmospheric transmittance in polar regions (effect of eruptions of volcanoes Pinatubo and Khadson),** *Izvestiya. Atmospheric and oceanic physics,* Feb. 1994, 29(4), p.549-550, Translated from Izvestiia. Fizika atmosfery i okeana. 4 refs.

Photometric measurements at Mirnyy Station from Aug. 1991 through Feb. 1992 revealed an increase in atmospheric optical thickness attributed to invasion of the polar atmosphere by ash from the eruptions of Mt. Pinatubo, Phillipines, and Khadson, Chile.

I-52073

McMinn, A., **Preliminary investigation of a method for determining past winter temperatures at Ellis Fjord, eastern Antarctica, from fast-ice diatom assemblages,** *Tokyo. National Institute of Polar Research. Memoirs. Special issue,* Aug. 1994, No.50, International Workshop on Holocene Environmental Changes in Antarctic Coastal Areas, Tokyo, Oct. 20-22, 1993. Proceedings. Edited by P.A. Berkman and Y. Yoshida, p.34-40, 9 refs.

The abundance of diatoms from the fast-ice mat community in sediment assemblages from the fjords of the Vestfold Hills has the potential to provide a proxy record of average winter temperature. Fast-ice cover on the fjords determines the proportion of diatoms from the fast-ice mat community in the sedimentary diatom assemblages. ANARE expeditioner records demonstrate a tentative relationship between fjord ice cover and average winter temperature. Short cores from Ellis Fjord, Taynaya Bay and Nella Fjord show fluctuations in the proportion of fast-ice diatoms but so far it has not been possible to correlate these with historical records. (Auth.)

I-52087

Parish, T.R., Bromwich, D.H., Tzeng, R.Y., **On the role of the antarctic continent in forcing large-scale circulations in the high southern latitudes,** *Journal of the atmospheric sciences,* Dec 15, 1994, 51(24), p.3566-3579, 26 refs.

The antarctic topography and attendant katabatic wind regime appear to play a key role in the climate of the high southern latitudes. During the nonsummer months, persistent and often intense katabatic winds occur in the lowest few hundred meters of the antarctic atmosphere. These slope flows transport significant amounts of cold air northward and thereby modify the horizontal pressure field over the high southern latitudes. Three-year seasonal cycle numerical simulations using the National Center for Atmospheric Research Community Climate Model Version 1 (CCM1) with and without representation of the antarctic orography were performed to explore the role of the elevated terrain and drainage flows on the distribution and evolution of the horizontal pressure field. The katabatic wind regime is an important part of a clearly defined mean meridional circulation in the high southern latitudes. The position and intensity of the attendant sea level low pressure belt appears to be tied to the antarctic orography. The seasonal movement of mass in the high southern latitudes is therefore constrained by the presence of the antarctic ice sheet. The semiannual oscillation of pressure over Antarctica and the high southern latitudes is well depicted in the CCM1 only when the antarctic orography is included. (Auth. mod.)

I-52089

Crowley, T.J., Baum, S.K., **Reconciling Late Ordovician (440 Ma) glaciation with very high (14X) CO_2 levels,** *Journal of geophysical research,* Jan. 20, 1995, 100(D1), p.1093-1101, 52 refs.

This paper examines the topic of Late Ordovician glaciation in the Southern Hemisphere by repeating the energy balance model experiments with a general circulation model (GCM) that enables explicit calculation of moisture and sea ice fields. CO_2, elevation, and ocean circulation effects can also be more accurately incorporated into the GCM. Utilization of the GCM also enables calculation of moisture budgets, an option which in turn yields results that have implications for the role of weathering feedbacks under altered CO_2 levels. An important assumption in this study is that summer temperature is the constraining factor for ice sheet initiation. Ice cap formation is impossible if it gets too hot in the summer. By thus addressing the problem, the study emphasizes a critical boundary condition necessary for glacial inception without introducing the significantly more complicated problem of subsequent growth of the ice sheet. It is assumed that permanent summer snow cover will lead to ice cap development within a geologically short interval (a few thousand years). (Auth. mod.)

I-52090

Wooldridge, P.J., Zhang, R.Y., Molina, M.J., **Phase equilibria of H_2, HNO_3, and HCl hydrates and the composition of polar stratospheric clouds,** *Journal of geophysical research,* Jan. 20, 1995, 100(D1), p.1389-1396, 42 refs.

Thermodynamic properties and phase equilibria behavior for the hydrates and coexisting pairs of hydrates of common acids which exist in the stratosphere and which participate in the formation polar stratospheric clouds, are assembled from new laboratory measurements and standard literature data. The analysis focuses upon solid-vapor and solid-solid-vapor equilibria at temperatures around 200 K and includes new calorimetric and vapor pressure data. Calculated partial pressures versus 1/T slopes for the hydrates and coexisting pairs agree well with experimental data where available. (Auth. mod.)

I-52091

Legrand, M., De Angelis, M., **Origins and variations of light carboxylic acids in polar precipitation,** *Journal of geophysical research,* Jan. 20, 1995, 100(D1), p.1445-1462, 54 refs.

This paper presents results of an investigation of variations of the carboxylic acid content of polar (central Greenland and East Antarctica) snow deposited over preindustrial (present climatic conditions as well as past cold climate) and modern time periods. Such data provide useful information on the relative contribution of various sources (hydrocarbon oxidation, biomass-burning, vegetation emissions) to the natural budget of these carboxylic acid species at high latitudes and on the impact of human activities. (Auth. mod.)

I-52100

Kunitake, M., **Research of neutral winds in the polar lower thermosphere using radar techniques,** *Journal of the Communications Research Laboratory,* Nov. 1993, 40(3), p.141-151, 8 refs.

Radar techniques are proved useful in researching neutral winds (the motion of the neutral atmosphere) in the lower thermosphere (80-150 km in altitude) in the polar region. Their usefulness is also confirmed for the research of dynamical coupling of the lower thermosphere with the magnetosphere through electrodynamics and with the mesosphere through aerodynamics. Statistical analyses of neutral wind variations with EISCAT (European Incoherent Scatter Radar) data are briefly introduced. The research of neutral winds by CRL, using a coherent 50-MHz Doppler radar system at Showa Station, is reviewed and its prospects for the future are discussed. (Auth.)

I-52101

Fraser, G.J., Portniagin, IU.I., Forbes, J.M., Vincent, R.A., Lysenko, I.A., Makarov, N.A., **Diurnal tide in the antarctic and arctic mesosphere/lower thermosphere regions,** *Journal of atmospheric and terrestrial physics,* Mar. 1995, 57(4), p.383-393, 15 refs.

The behavior of the diurnal tide at 95 km over various years between 1965 and 1986 is studied using radar data from Heiss I., Mawson, Molodezhnaya, and Scott Base. There are substantial fluctuations in amplitude and phase at all stations, particularly in winter. Phase fluctuations can be as large as a uniform random distribution over the 24-h cycle. In summer the phases of the meridional components are well defined and suggest the presence of a dominant symmetric mode. The meridional amplitudes are larger in summer whereas the zonal components have a greater variation and show no significant variation with season. (Auth. mod.)

I-52127

Helleis, F., Crowley, J., Moortgat, G.K., **Temperature dependent CH_3OCl formation in the reaction between CH_3O_2 and ClO,** *Geophysical research letters,* Aug. 15, 1994, 21(17), p.1795-1798, 15 refs.

In this work, the discharge-flow method combined with quantitative detection of both CH_3O_2 and CH_3OCl by mass-spectrometer was employed to directly measure a specific variation in the overall reaction between CH_3O_2 and ClO at the temperatures prevalent in the lower polar stratosphere at springtime. This experiment simulates processes inducing ozone depletion in the antarctic stratosphere. (Auth. mod.)

I-52131

Wigley, T.M.L., **Global-mean temperature and sea level consequences of greenhouse gas concentration stabilization,** *Geophysical research letters,* Jan. 1, 1995, 22(1), p.45-48, 18 refs.

The Intergovernmental Panel on Climate Change has defined a set of scenarios for future CO_2 concentrations stabilizing at levels of 350 to 750 ppmv. Using models previously employed, the implied global-mean temperature and sea level changes are calculated out to 2500. While uncertainties are large, the results show that even with concerted efforts to stabilize concentrations of greenhouse gases, substantial temperature and sea level increases can be expected to occur over the next century. Increases in sea level are likely to continue for many centuries after concentration stabilization because of the extremely long time scales associated with the deep ocean (which influences thermal expansion) and with the large ice sheets of Greenland and Antarctica. (Auth. mod.)

I-52132

Van Allen, R., Liu, X., Murcray, F.J., **Seasonal variation of atmospheric nitric acid over the South Pole in 1992,** *Geophysical research letters,* Jan. 1, 1995, 22(1), p.49-52, 22 refs.

During year-round measurements of mid infrared atmospheric emission over the South Pole in 1992, a large seasonal change of the total column of nitric acid (HNO_3) vapor was observed. During the summer, the HNO_3 column abundance was about $2x10^{16}$ molecules/cm^2. There was a small increase in the fall. A rapid decrease of 50% was observed in late June, soon after the stratospheric temperature reached the threshold for formation of type I polar stratospheric clouds (PSCs) By early July, the stratospheric temperature was cold enough to form type II PSCs, and the HNO_3 column decreased to $7x10^{15}$ molecules/cm^2. Measured nitric acid values in the spring remained extremely low even after the stratosphere warmed well above PSC temperatures. This may indicate permanent removal of HNO_3 by gravitational settling, or long-term sequestering in large particles. Normal summer values were not observed until the vortex dissipated and allowed the lateral transport of HNO_3 to the south polar region. (Auth. mod.)

I-52133

Genthon, C., Armengaud, A., **GCM simulations of atmospheric tracers in the polar latitudes: South Pole (Antarctica) and Summit (Greenland) cases,** *Science of the total environment,* Jan. 1995, Vol.160/161, International Symposium on the Ecological Effects of Arctic Airborne Contaminants, Reykjavik, Iceland, Oct. 4-8, 1993. Collection of papers. Edited by D.H. Landers and S.J. Christie, p.101-116, 33 refs.

Simulation results from two global atmospheric tracer/climate models in the interior of the two major ice sheets at high northern and southern latitudes are presented and discussed. The models are based on two existing general circulation models (GCMs) of the atmosphere, complemented with tracer formulations (sources, transport, mixing, deposition, etc.). The seasonal and shorter term variability of desert dust, sea salt, ^{222}Rn, ^{210}Pb, and ^{7}Be have been studied at the South Pole in Antarctica and at Summit in Greenland. This choice of tracers and test regions serves to focus on the interactions between atmospheric parameters (e.g. the strong and durable surface inversions characteristic of the ice sheets) and tracers, and to limit other influences such as source variability and chemistry. Comparison with available observations is not consistently favorable. Short-term variability in the atmosphere (^{222}Rn and ^{210}Pb) appears qualitatively seasonable. Seasonal cycles are in some instances opposite to those observed, and mean deposition is clearly too high. The coarseness of model resolution at the high latitudes and the difficulty of setting up efficient formulations for microphysical tracer processes (e.g. dry and wet deposition) are major sources of problems. (Auth. mod.)

I-52134

Corazza, E., Tesi, G., **Tropospheric hydrogen and carbon oxides in Antarctica and in Greenland,** *Science of the total environment,* Jan. 1995, Vol.160/161, International Symposium on the Ecological Effects of Arctic Airborne Contaminants, Reykjavik, Iceland, Oct. 4-8, 1993. Collection of papers. Edited by D.H. Landers and S.J. Christie, p.803-809, 18 refs.

Tropospheric trace gases (H_2, CO, and CO_2) were measured in polar areas for two seasons in Antarctica (Italian base Terra Nova Bay) and two in Greenland (European base Summit, Greenland Icecore Program [GRIP]), yielding the following average concentrations: Antarctica (1989-90): H_2, 528 ppvb; CO, 51 ppbv; CO_2, 354 ppmv; Antarctica (1990-91): H_2, 522; CO, 51; Greenland (1991): H_2, 548; CO, 114; Greenland (1992): CO, 107 (hydrogen discarded). Computer automated gas chromatographic analyses were done *in situ* using a reduction gas detector (RGD) and a complete set of standards each day, for periods of 2 h in Greenland and 3 h in Antarctica. Approximately 200 analyses were conducted during each campaign. Peak areas and standard calibrations in the laboratory were obtained using programs written especially for the purpose. For both Antarctica and Greenland, some differences were found between the two subsequent seasons; the greatest differences, however, were found in Antarctica within the same season (different origins of air masses). The inter-hemispheric asymmetry is clear and significant. It most likely occurs because pollution from the Northern Hemisphere reaches the northernmost regions through the polar vortex, whereas Antarctica is more isolated by the southern ocean. (Auth. mod.)

I-52139

Bromwich, D.H., ed, Stearns, C.R., ed, **Antarctic meteorology and climatology: studies based on automatic weather stations,** *American Geophysical Union. Antarctic research series,* 1993, Vol.61, 207p., Refs. passim. For individual papers see 49-2781 through 49-2790 or I-52140 through I-52149.

DLC QC994.9.A58 1993

This volume provides examples of the application of state-of-the-art technology to fundamental problems in antarctic meteorology and climatology. The technology, particularly as related to instrumentation and satellite communication, has been developed and applied in response to specific scientific needs. In its original conception the volume contents were limited to the U.S. antarctic automatic weather station (AWS) program at the University of Wisconsin-Madison and to the results flowing from analysis of the collected data. The focus subsequently shifted to include a broader collection of papers on atmospherically related topics. Thus this volume, in addition to illustrating the importance and usefulness of antarctic automatic weather station data, can also serve as an introduction to a number of basic issues in antarctic meteorology and climatology.

I-52140

Stearns, C.R., Keller, L.M., Weidner, G.A., Sievers, M., **Monthly mean climatic data for antarctic automatic weather stations,** *American Geophysical Union. Antarctic Research Series,* 1993, Vol.61, Antarctic meteorology and climatology: studies based on automatic weather stations. Edited by D.H. Bromwich and C.R. Stearns, p.1-21, 29 refs.

DLC QC994.9.A58 1993

Automatic weather station (AWS) units were installed at remote locations in Antarctica to supplement the few research stations making meteorological observations. Most AWS units were positioned in data-sparse regions in support of field experiments. Monthly means and extremes for air pressure, air temperature, wind speed, and wind direction for the AWS sites are available in tabular form. Since data collection in such a hostile environment is difficult, possible errors and/or problems are discussed. Some analysis of the longer-term climatic record is included for specific AWS sites representing different climatic regimes. The data show that research stations located in protected areas along the coast of Antarctica do not represent the meteorology of the interior of Antarctica. Comparisons made between the AWS and research stations show that the AWS do as well as the research stations in measuring air pressure and air temperature. (Auth.)

I-52141

Wendler, G., André, J.C., Pettré, P., Gosink, J., Parish, T.R., **Katabatic winds in Adélie Coast,** *American Geophysical Union. Antarctic Research Series,* 1993, Vol.61, Antarctic meteorology and climatology: studies based on automatic weather stations. Edited by D.H. Bromwich and C.R. Stearns, p.23-46, 76 refs.

DLC QC994.9.A58 1993

A decade ago, a joint U.S.-French experiment commenced in Adélie Coast. The experiment is called IAGO, for Interactions-Atmosphere-Glace-Océan. One of the main purposes of this investigation is to obtain a better understanding of the katabatic wind, which is very well developed in this area. This paper summarizes some of the findings to date. It discusses the climatology of the area, detailed vertical measurements through the boundary layer, radiative and energy budget fluxes, flowing snow and its effects on the gravity flow, the hydraulic jump (Loewe phenomenon), and modeling efforts. (Auth.)

I-52142

Bromwich, D.H., Parish, T.R., Pellegrini, A., Stearns, C.R., Weidner, G.A., **Spatial and temporal characteristics of the intense katabatic winds at Terra Nova Bay, Antarctica,** *American Geophysical Union. Antarctic Research Series,* 1993, Vol.61, Antarctic meteorology and climatology: studies based on automatic weather stations. Edited by D.H. Bromwich and C.R. Stearns, p.47-68, 40 refs.

DLC QC994.9.A58 1993

Two years of automatic weather station observations describing the linkage between the inland confluence zone and the intense coastal katabatic wind regime at Terra Nova Bay are analyzed. A highly stable wind regime is described by the data with the air over the plateau converging into the head of Reeves Glacier, descending dry adiabatically to the Nansen Ice Sheet, and apparently accelerating horizontally down the local pressure gradient to Inexpressible I., which is situated along the western shore of Terra Nova Bay. This low-level jet of cold air is laterally confined and is only slightly responsive to synoptic forcing. The internal dynamics of the airstream is the dominant factor determining its behavior. Lateral fluctuations in the katabatic wind are primarily controlled by buoyancy variations. (Auth.)

I-52143

Breckenridge, C.J., Radok, U., Stearns, C.R., Bromwich, D.H., **Katabatic winds along the Transantarctic Mountains,** *American Geophysical Union. Antarctic Research Series,* 1993, Vol.61, Antarctic meteorology and climatology: studies based on automatic weather stations. Edited by D.H. Bromwich and C.R. Stearns, p.69-92, 11 refs.

DLC QC994.9.A58 1993

Thermal infrared satellite imagery of the Ross Ice Shelf often indicates dark streaks emanating from the major glaciers of the Transantarctic Mountains. Other authors have shown that these streaks indicate katabatic wind activity. In the present study, satellite imagery, automatic weather station (AWS) data and synoptic analyses are used to characterize such activity for the 1982 austral winter. Over 50% of all available thermal infrared satellite images (both with and without cloud cover) containing the Ross I. area and Skelton, Mulock, and Byrd glaciers show katabatic winds at one or more of these glaciers. Comparison of a case of intense katabatic winds in June 1982 with a case during July 1982 devoid of such winds indicates a dramatic difference in the supply of radiationally cooled near-surface air over the polar plateau. During the intense katabatic event, surface temperatures recorded by an AWS on the East Antarctic plateau are up to 45°C colder than surface temperatures at AWS sites on the Ross Ice Shelf, with potential temperatures up to 15 K lower. By contrast, during the case without katabatic winds, surface temperatures on the plateau are up to 15°C warmer (potential temperatures up to 45 K higher) than those on the Ross Ice Shelf. (Auth. mod.)

I-52144

Carrasco, J.F., Bromwich, D.H., **Satellite and automatic weather station analyses of katabatic surges across Ross Ice Shelf,** *American Geophysical Union. Antarctic Research Series,* 1993, Vol.61, Antarctic meteorology and climatology: studies based on automatic weather stations. Edited by D.H. Bromwich and C.R. Stearns, p.93-108, 25 refs.

DLC QC994.9.A58 1993

Thermal infrared satellite images from three winter months in 1988 were studied to evaluate the occurrence of dark (warm) signatures coming from southern Marie Byrd Land and extending across the Ross Ice Shelf in a direction generally parallel to the Transantarctic Mountains. The presence of these features around Siple Coast was a very frequent event and is inferred to be caused by the persistent katabatic drainage from Marie Byrd Land. At times the signatures extended all the way across the ice shelf to the Ross Sea, a horizontal distance of about 1000 km. This took place even though the downslope buoyancy force is near zero over the ice shelf. Periods of maximum decrease of pressure over the northeastern Ross Ice Shelf and/or around the Russkaya Station area were associated with the occurrence of this phenomenon. Synoptic analyses indicated that the pressure decreases were caused by the passage of synoptic storms over the southern Amundsen Sea. This led to an increase of the pressure gradient over Marie Byrd Land and the Ross Ice Shelf, which primarily supported the horizontal propagation of katabatic winds from West Antarctica for great distances across the Ross Ice Shelf. Three detailed case studies are presented to illustrate the typical characteristics of these events. (Auth.)

I-52145

Stearns, C.R., Weidner, G.A., **Sensible and latent heat flux estimates in Antarctica,** *American Geophysical Union. Antarctic Research Series,* 1993, Vol.61, Antarctic meteorology and climatology: studies based on automatic weather stations. Edited by D.H. Bromwich and C.R. Stearns, p.109-138, 16 refs.

DLC QC994.9.A58 1993

During the 1983-1984 field season in Antarctica, three units were installed that measured vertical air temperature difference between the nominal heights of 0.5 m and 3.0 m and relative humidity at a nominal height of 3 m. The measurements of the vertical air temperature difference and the relative humidity are the minimum required to estimate the sensible and latent heat fluxes to the air and also do not exceed the available energy requirements for the weather stations. The monthly mean values of the sensible heat fluxes on the Ross Ice Shelf are negatively large near the Transantarctic Mountains during the winter months and less negative to the east of the Transantarctic Mountains. During the summer months the monthly mean sensible heat fluxes are positive on the Ross Ice Shelf. At one site on the blue ice at the base of the Reeves Glacier, the estimated annual sublimation of ice equivalent was 0.23 m, and the estimate of the actual ablation of the ice was 0.26 m. The estimates of the net annual sublimation and deposition on the Ross Ice Shelf amount to 20-80% of the annual accumulation. The authors conclude that the assumption that annual sublimation and deposition are zero is not valid under antarctic conditions. (Auth. mod.)

I-52146

Wendler, G., Kodama, Y., **Kernlose winter in Adélie Coast,** *American Geophysical Union. Antarctic Research Series,* 1993, Vol.61, Antarctic meteorology and climatology: studies based on automatic weather stations. Edited by D.H. Bromwich and C.R. Stearns, p.139-147, 33 refs.

DLC QC994.9.A58 1993

Five automatic weather stations (AWS) provided for the first time year-round data in a region in Antarctica stretching from near the ocean to the high plateau at 3280 m altitude. All of these stations displayed the typical pattern of a kernlose winter, which means there is no systematic temperature change for the six winter months. Some of the more interesting results for the six winter months are as follows: (1) no relationship between temperature and wind speed could be established for any slope stations. Only for the station on Dome Charlie (Dome C), located on a flat ice dome, did increasing wind speeds bring milder temperatures. (2) The wind direction showed a stronger downslope component during cold spells for all slope stations. (3) The atmospheric pressure difference between stations was larger during cold spells than during warm spells. (4) The absolute temperature variation in winter increased when going inland. (5) The interdiurnal pressure variation, which can be taken as an index of cyclonic activity, was not related to temperature. (6) During cold spells, low atmospheric pressure was observed, while for warm spells the atmospheric pressure was above normal. While the first four points can be easily understood, the latter two are surprising and more difficult to explain. Some explanations are offered. (Auth.)

I-52147

Smith, S.R., Stearns, C.R., **Antarctic climate anomalies surrounding the minimum in the southern oscillation index,** *American Geophysical Union. Antarctic Research Series,* 1993, Vol.61, Antarctic meteorology and climatology: studies based on automatic weather stations. Edited by D.H. Bromwich and C.R. Stearns, p.149-174, 25 refs.

DLC QC994.9.A58 1993

Composites of antarctic monthly surface pressure and temperature anomalies and the Southern Oscillation Index (SOI) were used to analyze the relationships between the climate of Antarctica and the El Niño/Southern Oscillation (ENSO). Annual composites created for the year before and the year after the minimum in the SOI used data surrounding six SOI minima occurring between 1957 and 1984. Comparisons were made between these ENSO warm phase composites and similar annual composites for non-warm phase years. Also compared are the six individual ENSO warm phases and the warm phase annual composites to determine the reliability of the composites. Three-month composites for the 24 months surrounding the SOI minimum look at the evolution of antarctic anomalies in a warm phase. A distinct change in the sign of the annual pressure and temperature anomalies was noted between the year before and the year after the minimum in the SOI. (Auth. mod.)

I-52148

Hogan, A.W., Riley, D., Murphey, B.B., Barnard, S.C., Samson, J.A., **Variation in aerosol concentration associated with a polar climate iteration,** *American Geophysical Union. Antarctic Research Series,* 1993, Vol.61, Antarctic meteorology and climatology: studies based on automatic weather stations. Edited by D.H. Bromwich and C.R. Stearns, p.175-199, 119 refs.

DLC QC994.9.A58 1993

This paper presents analyses which follow warm, aerosol-laden cyclonic systems across the Ross Ice Shelf, using automatic weather station data. Subsequent discussion indicates that marine aerosol deposits in the interior antarctic ice may reflect a recent climatic iteration of surface temperature and aerosol concentration. The antarctic continental (cA) air mass is rarely displaced from the south polar plateau, but it is frequently modified by exchange with antarctic maritime (mA) air advected from the ice shelves or frozen seas or with polar maritime (mP) air advected from the southern oceans. Because the cA air mass resides over an uninhabited and relatively static ice-covered surface, the concentration of aerosol particles in this unique air mass may reflect aerosol variation in the global atmosphere. Although a large seasonal variation in aerosol concentration is present, little year-to-year variation in mean seasonal aerosol concentration occurred prior to 1982. A consistent diminution of mean annual aerosol concentration occurred during the 1980s, and a concurrent reduction in sodium concentration in snow and firn was also found. (Auth. mod.)

I-52149

McKay, C.P., Nienow, J.A., Meyer, M.A., Friedmann, E.I., **Continuous nanoclimate data (1985-1988) from the Ross desert (McMurdo Dry Valleys) cryptoendolithic microbial ecosystem,** *American Geophysical Union. Antarctic Research Series,* 1993, Vol.61, Antarctic meteorology and climatology: studies based on automatic weather stations. Edited by D.H. Bromwich and C.R. Stearns, p.201-207, 29 refs.

DLC QC994.9.A58 1993

The authors collected year-round nanoclimate data for the cryptoendolithic microbial habitat in sandstones of the Ross desert obtained with an Argos satellite data system. Data for two sites in the McMurdo Dry Valleys are available: Linnaeus Terrace (Jan. 1985 to June 1988), and Battleship Promontory (1986-1987). The focus of this research is ecological; hence year-round environmental data have been obtained for the ambient environment as well as for conditions within the rock. Using data from the summer, the authors compare conditions inside the rock to the outside weather. This demonstrates how the rock provides a shelter for the endolithic microbial community. The most important property of the rock is that it absorbs summer sunlight, thereby warming to temperatures above freezing. This warming allows snowmelt to seep into the rock, and the moisture level in the rocks can remain high for weeks against loss to the dry environment. (Auth.)

I-52167

König-Langlo, G., Augstein, E., **Parameterization of the downward long-wave radiation at the Earth's surface in polar regions,** *Meteorologische Zeitschrift,* Dec. 1994, 3(6), p.343-347, With German summary. 14 refs.

Various parameterization schemes for the downward long-wave radiation at the Earth's surface which have been frequently applied in sea ice and snow cover models are tested with the aid of one year's measurements at the German stations Koldewey and Neumayer in the Arctic and Antarctic, respectively. These concepts are based on the Stefan-Boltzmann radiation law with an empirically derived effective atmospheric emissivity. The data confirm the distinct dependency of the latter on cloudiness, but no other influences, e.g. due to falling ice crystals (diamond dust), were determined to be significant. The low level atmospheric water vapor pressure need not be considered explicitly in the formulae. A simple scheme for atmospheric emissivity which is comparable to the more complex models for polar regions is therefore proposed. (Auth. mod.)

I-52183

Hamilton, K., Wilson, R.J., Mahlman, J.D., Umscheid, L.J., **Climatology of the SKYHI troposphere-stratosphere-mesosphere general circulation model,** *Journal of the atmospheric sciences,* Jan. 1, 1995, 52(1), p.5-43, 80 refs.

The long-term mean climatology obtained from integrations conducted with different resolutions of the GFDL (Geophysical Fluid Dynamics Laboratory) "SKYHI" finite-difference general circulation model is examined. A number of improvements that have been made recently in the model are also described. The integrations all employ a fixed climatological cycle of sea surface temperature. Over 25 years of integration with the 3° model and shorter integrations with the higher-resolution versions are analyzed. Attention is focused on the Dec.-Feb. and June-Aug. periods. The model does a reasonable job of representing the atmospheric flow in the troposphere and lower stratosphere. The simulated tropospheric climatology has an interesting sensitivity to horizontal resolution. In common with several spectral GCMs that were examined earlier, the surface zonal-mean westerlies in the SKYHI extratropics become stronger with increasing horizontal resolution. However, this "zonalization" of the flow with resolution is not as prominent in the upper troposphere of SKYHI as it is in some spectral models. It is noteworthy that—without parameterized gravity wave drag—the SKYHI model at all three resolutions can simulate a realistic separation of the subtropical and polar night jet streams and a fairly realistic strength of the lower-stratospheric winter polar vortex. (Auth. mod.)

I-52184

Wendler, G., Meitner, R., **Satellite-derived outgoing longwave radiation, surface temperature and sea ice concentration off the coast of Adélie-Land, Eastern Antarctica,** *Meteorology and atmospheric physics,* 1993, Vol.51, p.219-226, 33 refs.

Outgoing longwave radiation (OLR) as seen from satellite (NOAA series), and sea ice concentration at Dumont d'Urville Station were analyzed. For the time period 1974-1990, available radiative flux data showed a slight increase of 1.8 W/m^2 or 1% for the period. If this trend should continue (trends over a 16-year period in any geophysical data is a rather questionable concept in isolation) a 4°C warming would be observed from space for this polar region over a century. The observed increase is, however, in agreement with Dumont d'Urville, the only ground station within the study area, which displayed a similar temperature increase. It is also in agreement with the general temperature increase which has been observed for the high southern latitudes. In addition, models of climate change due to increased CO_2 and other trace gases predict for polar regions values of similar magnitude. (Auth. mod.)

I-52186

Jones, H.G., ed, Davies, T.D., ed, Ohmura, A., ed, Morris, E.M., ed, **Snow and ice covers: interactions with the atmosphere and ecosystems,** *International Association of Hydrological Sciences. IAHS publication,* 1994, No.223, 339p., Refs. passim. Presented at a joint IAMAP/IAHS symposium in Yokohama, Japan, July 1993. The International Association of Meteorology and Atmospheric Physics (IAMAP) was subsequently renamed the International Association of Meteorology and Atmospheric Sciences (IAMAS). For individual papers see 49-2917 through 49-2948 or F-52189, I-52187, I-52188 and I-52190.

Of some 32 papers, mainly on energy exchange between snow and ice covers and the atmosphere, and snow and glacial runoff, four papers are explicitly pertinent to the Antarctic, in particular: the radiative effects of clouds, ice sheet and sea ice; katabatic winds over a sloping ice sheet; modeling of mass and energy exchange over polar snow; and the moisture budget in the antarctic atmosphere.

I-52187

Yamanouchi, T., Charlock, T.P., **Radiative effects of clouds, ice sheet and sea ice in the Antarctic,** *International Association of Hydrological Sciences. IAHS publication,* 1994, No.223, Snow and ice covers: interactions with the atmosphere and ecosystems. Edited by H.G. Jones, T.D. Davies, A. Ohmura, and E.M. Morris, p.29-34, 11 refs. Presented at a joint IAMAP/IAHS symposium in Yokohama, Japan, July 1993.

The effects of clouds, ice sheet and sea ice on the radiation budget in the Antarctic were examined using the ERBE (Earth Radiation Budget Experiment) data and surface observations at antarctic stations in 1987-88. Long-wave radiation emitted by clouds was found to heat the surface throughout the year and strongly cool the atmosphere over Antarctica. The elevation of the ice sheet surface reduces the outgoing long-wave radiation, making the radiation budget in the two polar regions asymmetric. Sea ice had a significant impact on radiation; however, cloud distribution reduced the effect. (Auth.)

I-52188

Kobayashi, S., Ishikawa, N., Ohata, T., Kawaguchi, S., Chiba, O., **Some characteristics of an atmospheric boundary layer on the sloped ice sheet at Mizuho Station, East Antarctica,** *International Association of Hydrological Sciences. IAHS publication,* 1994, No.223, Snow and ice covers: interactions with the atmosphere and ecosystems. Edited by H.G. Jones, T.D. Davies, A. Ohmura, and E.M. Morris, p.41-52, 11 refs. Presented at a joint IAMAP/IAHS symposium in Yokohama, Japan, July 1993.

Measurements were made of vertical wind speed components, using two sonic anemothermometers mounted at heights of 3 m and 30 m on a 30 m high micrometeorological tower at Mizuho Station. The existence of a shear instability wave with a period of about 10 to 20 s was revealed. The maximum amplitude of the wave was found when the surface layer had a local gradient Richardson number smaller than 0.24. Such waves were observed when a strong surface inversion was progressing above the snow surface after the katabatic wind had been disturbed by a synoptic scale disturbance. Acoustic sounding was also used in observing a katabatic wind layer at the lowest few hundred meters over Mizuho Station. Observations disclosed that wave-like motion exists in a layer between heights of 100 m and 300 m, and has a shorter period than the calculated value from the Brunt-Väisälä frequency. This discrepancy was explained by a simple two-dimensional wave equation which accounted for katabatic flow. (Auth. mod.)

I-52190

Yamazaki, K., **Moisture budget in the antarctic atmosphere,** *International Association of Hydrological Sciences. IAHS publication,* 1994, No.223, Snow and ice covers: interactions with the atmosphere and ecosystems. Edited by H.G. Jones, T.D. Davies, A. Ohmura, and E.M. Morris, p.61-67, 7 refs. Presented at a joint IAMAP/IAHS symposium in Yokohama, Japan, July 1993.

Climatologies of moisture flux, its convergence and accumulation rate for the antarctic region are derived from the 5-year (1986-90) twice-daily US NMC (National Meteorological Center) objective analysis data. Over the southern ocean, eastward moisture flux is dominant, while westward flux exists along the antarctic coastline. The estimate of mean annual poleward net water vapor transport across 70°S is 4.8±0.6 kg/m/s. The annual mean moisture flux convergence (accumulation rate) is positive along the coastline; the maximum of 3 mm/day is found on the west coast of the Antarctic Peninsula, while it is small inland. The estimated annual accumulation over Antarctica is 135±18 mm. As for seasonal variation, the accumulation is large in winter along the coast and over Antarctica as a whole, while it is large in summer in the inland elevated region. (Auth. mod.)

I-52204

Müller, R., Crutzen, P.J., **On the relevance of the methane oxidation cycle to "ozone hole" chemistry,** NASA. Goddard Space Flight Center: Ozone in the troposphere and stratosphere, Part 1, Washington, D.C., U.S. National Aeronautics and Space Administration, 1994, p.298-301, N95-10661, 15 refs.

The authors focus on the influence of the methane oxidation cycle on 'ozone hole' chemistry through its effect on HOx and ClOx radicals. They demonstrate the potential importance of the heterogeneous reaction HCl+HOCl yields Cl_2+H_2O and the gas phase reaction $ClO+CH_3O_2$ yields $ClOO+CH_3O$ under sunlight conditions in polar spring. Under these conditions, the heterogeneous reaction is the main sink for HOx radicals. Through this channel the HCl reservoir may be almost completely depleted. The gas phase reaction may control the levels of the CH_3O radical, provided that high levels of ClO exist. Otherwise this radical initiates a sequence of reactions leading to a considerable loss of active chlorine. Moreover, the production of HOx radicals is reduced, and thereby the efficiency of the heterogeneous reaction is limited. The two reactions together may accomplish the complete conversion of HCl into active chlorine, thereby leading to a rapid destruction of ozone. (Auth. mod.)

I-52216

Kejna, M., **Influence of synoptic situations on the cloudiness and sunshine duration in Arctowski Station (South Shetland Islands) in the years 1986-1989,** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.209-213, 8 refs.

Following T. Niedźwiedź (1981), 21 types of synoptic situations were defined which take into account the kind of baric center and the direction of air masses advection. In the region of the South Shetlands, cyclonic circulation dominates. In the years 1986-89, the percentage of days of the cyclonic types was 69.8, and that of the anticyclonic, 27.4. The remaining percentage belongs to type X. The types of advection from the western sector are characterized by especially high frequency of occurrence: SWc 17.8%, Wc 13.7%, NWc 13.2% and SWa 4.8%. The least frequent is the advection from east and south. In this work, the mean degree of cloudiness, mean number of hours with sunshine, and relative sunshine duration were calculated for each of the 21 circulation types and are shown in a table.

I-52230

Barrie, L.A., Delmas, R.J., **Polar atmosphere and snow chemistry,** Scientific Conference of the International Global Atmospheric Chemistry Project(IGAC), Eilat, Israel, Apr. 18-22, 1993. Proceedings. Global atmospheric-biospheric chemistry. Edited by R.G. Prinn and Environmental science research, Vol.48, New York, Plenum Press, 1994, p.149-164, 51 refs.

DLC QC879.6.P73

In IGAC's (International Global Atmospheric Chemistry Project) Polar Atmosphere and Snow Chemistry (PASC) Activity, a group of environmental scientists are studying global change in the polar regions. Experiments include atmospheric composition measurements, atmosphere-snow exchange studies and snow/ice composition measurements on glaciers. The latter are situated at different altitudes and locations in the polar regions, forming a network of glacial atmospheric sampling sites that represent time since at least the last interglacial period. This paper highlights some of the recent results obtained by the PASC group pertaining to global change. Data from both polar regions are included. (Auth. mod.)

I-52231

Argentini, S., Ocone, R., Fiocco, G., Mastrantonio, G., **Statistical analyses of katabatic winds in the neighborhood of Terra Nova Bay, Antarctica,** International Symposium on Acoustic Remote Sensing of the Atmosphere and Oceans, 5th, New Delhi, India, Feb. 6-9, 1990. Proceedings. Edited by S.P. Singal, New Delhi, Tata McGraw-Hill Publishing Co., 1990, p.283-293, 10 refs.

DLC QC871.I48

Katabatic winds constitute one of the main features of the antarctic circulation. They originate on the Antarctic Plateau and can reach extremely high speed in their descent towards the low level coastal areas. The katabatic winds, a boundary layer phenomenon, are only weakly coupled to the air flow above and display a high degree of persistence. They are mainly governed by surface temperature inversion and by terrain slope. Statistical analyses of data collected during two successive antarctic summer campaigns in the Terra Nova Bay area with a three-axis monostatic sodar system are presented. In the first campaign the system operated at the Italian base on the coast while in the latter the same system was installed at a distance of about 30 km on the Nansen Ice Sheet. Examples of katabatic wind regimes in the two sites are shown.

I-52233

Zhou, S.Z., **Some problems on the research of astronomical theory of ice age,** *Journal of glaciology and geocryology,* Mar. 1994, 16(1), p.85-92, In Chinese with English summary. 27 refs.

The astronomical, also called the Milankovitch, theory of the Ice Age is now widely accepted, though there are still some question whether the Ice Age occurred at high or low eccentricity of the Earth's orbit; whether summer or winter insolation played the greater role; and why glaciations between the northern and southern hemispheres were synchronous. It is suggested that the Ice Age occurred at low eccentricity because then the mean sun-earth distance became long; that lower temperatures and insolation in summer rather than winter were more decisive; and that reduction in global atmospheric CO_2 concentrations may have produced synchronicity between the two hemispheres despite the counter effect of the Earth's precession.

I-52282

Zhou, X.J., Zheng, X.D., Lu, L.H., Guo, S., **Ground-based measurements of column amounts of ozone and UV-B over Zhongshan Station, Antarctica, in the 93 "ozone hole",** *Antarctic research (Chinese edition),* Dec. 1994, 6(4), p.14-22, In Chinese with English summary. 16 refs.

The Brewer ozone spectrophotometer at Zhongshan Station provided hourly ground-based measurements of O_3 and UV-B in the 1993 ozone hole. These measurements define the column ozone abundance and the UV-B radiation environment of the region and, in conjunction with a daily record of sky conditions and the upper atmospheric temperature, permit a general understanding of the close relationship between the ozone and stratospheric temperature, as well as the role of ozone and cloud cover in regulating UV-B radiation levels at the surface in the period of ozone depletion. Low column ozone abundance (near or below 220DU) was detected from Aug. to the end of Nov., and a normal abundance (near or above 260DU) abundance and the temperature from 70hPa to 50hPa altitude were observed. Daily variations of UV-B radiation are greatly controlled by the solar zenith angle (SZA), ozone and the sky conditions. Preliminary statistical analyses show that noontime biologically weighted damaging UV-B (DUV-B) flux is a negative exponential function of slant ozone column abundance. Spectral scanning shows that in the UV-B range, ground surface irradiance of shorter wavelengths is influenced by the changes of the ozone column abundance. (Auth.)

I-52287

Lu, D.R., Li, W., **Present situation and prospect of the UV-B climatology in Antarctica,** *Antarctic research (Chinese edition),* Dec. 1994, 6(4), p.59-66, In Chinese with English summary. 14 refs.

The increase of UV-B radiation in Antarctica as a direct consequence of ozone depletion, and the unfavorable changes in the ecosystems that must result, are discussed. Recent progress made in the research of antarctic UV-B climatology is reviewed, the problems are analyzed and possible solutions are examined. (Auth. mod.)

I-52320

Simmonds, I., Law, R., **Associations between antarctic katabatic flow and the upper level winter vortex,** *International journal of climatology,* Apr. 1995, 15(4), p.403-421, 26 refs.

This paper addresses the extent to which modifications to the surface wind field over Antarctica impact on the upper level winter vortex. This is approached by performing two sensitivity studies with a general circulation model. The first experiment eliminates the katabatic outflow from the continent by removing the slope; the second experiment weakens the surface flow by increasing the surface momentum drag coefficient over Antarctica. The results show a weakened upper level circulation in the no-topography experiment but a strengthened vortex in the increased-drag experiment. The different response is related to the effect of the boundary forcings on the thermal structure of the atmosphere. In the no-topography simulation, significant warming occurs throughout the antarctic troposphere and this is apparently associated with changes in cyclone behavior. This appears to be the dominant effect on the upper level vortex. In the drag case the impact on temperature is much smaller but is still an important influence on the upper level circulation. (Auth. mod.)

I-52322

Wayne, R.P., **Elements of stratospheric and tropospheric chemistry,** NATO Advanced Study Institute on Low-temperature Chemistry of the Atmosphere, Maratea, Italy, Aug. 29-Sep. 11, 1993. Proceedings. Edited by G.K. Moortgat et al and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.21, Berlin, Springer-Verlag, 1994, p.21-48, 28 refs.

DLC QC879.6.L69

This paper addresses specific topics in the chemistry of the stratosphere and the troposphere. In particular, it considers in some detail the processes that generate and destroy ozone in the two regions of the polar atmospheres. (Auth. mod.)

I-52323

Golden, D.M., Williams, L.R., **Heterogeneous chemistry and kinetics,** NATO Advanced Study Institute on Low-temperature Chemistry of the Atmosphere, Maratea, Italy, Aug. 29-Sep. 11, 1993. Proceedings. Edited by G.K. Moortgat et al and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.21, Berlin, Springer-Verlag, 1994, p.235-262, 39 refs.

DLC QC879.6.L69

This paper explores some of the laboratory methods for measurement of uptake coefficients in order to simulate cloud chemical reactions in the polar stratosphere. In addition, some Knudsen cell data on solubility of HNO_3, HCl, and HBr in sulfuric acid representative of stratospheric compositions are presented. (Auth. mod.)

I-52324

Tolbert, M.A., **Laboratory studies of heterogeneous reactions,** NATO Advanced Study Institute on Low-temperature Chemistry of the Atmosphere, Maratea, Italy, Aug. 29-Sep. 11, 1993. Proceedings. Edited by G.K. Moortgat et al and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.21, Berlin, Springer-Verlag, 1994, p.263-285, 72 refs.

DLC QC879.6.L69

In the present review, experimental measurements are summarized for heterogeneous reaction rates on laboratory surfaces that model stratospheric particulate. In addition to measurements of heterogeneous reaction rates, the review also considers laboratory studies of trace gas solubility in stratospheric aerosols. The findings are pertinent to polar stratospheric clouds (PSC).

I-52325

Chesters, M.A., Horn, A.B., **Surface spectroscopy,** NATO Advanced Study Institute on Low-temperature Chemistry of the Atmosphere, Maratea, Italy, Aug. 29-Sep. 11, 1993. Proceedings. Edited by G.K. Moortgat et al and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.21, Berlin, Springer-Verlag, 1994, p.307-327, 20 refs.

DLC QC879.6.L69

The use of surface sensitive spectroscopy in the study of heterogeneous processes is receiving much interest because of its potential for detailed elemental and molecular fragment identification. In this paper, some commonly used surface analytical spectroscopies are reviewed and their possible application to the *in situ* laboratory study of atmospheric processes is discussed. The techniques which currently show the greatest promise for the study of reactions on ice and NAT surfaces under realistic stratospheric conditions are discussed at greater length. The most popular current technique is infrared spectroscopy. The application of IR to *in situ* studies is complicated, and methods for optimizing the sensitivity towards surface reactions are discussed at length. Finally, infrared spectroscopic measurements on some real atmospheric systems are described in detail. This work is pertinent to polar ozone chemistry. (Auth. mod.)

I-52326
Tolbert, M.A., Middlebrook, A.M., Koehler, B.G., **Spectroscopic studies of PSCs,** NATO Advanced Study Institute on Low-temperature Chemistry of the Atmosphere, Maratea, Italy, Aug. 29-Sep. 11, 1993. Proceedings. Edited by G.K. Moortgat et al and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.21, Berlin, Springer-Verlag, 1994, p.329-349, 22 refs.

DLC QC879.6.L69

Using Fourier transform infrared (FTIR) spectroscopy, this paper examines nitric-acid/ice films that model polar stratospheric clouds. First it identifies the FTIR spectra of amorphous H_2O:HNO_3 mixtures as well as crystalline nitric acid monohydrate (NAM), NAD and two forms of NAT (α and β-NAT). Then these spectra are used to identify the form of HNO_3/H_2O that grows in laboratory experiments mimicking PSC growth. Finally, the possibility of using FTIR spectroscopy in field observations of type I PSCs is discussed.

I-52327
Barnes, A.J., **Matrix isolation spectroscopy: technique and applications,** NATO Advanced Study Institute on Low-temperature Chemistry of the Atmosphere, Maratea, Italy, Aug. 29-Sep. 11, 1993. Proceedings. Edited by G.K. Moortgat et al and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.21, Berlin, Springer-Verlag, 1994, p.351-372, 47 refs.

DLC QC879.6.L69

Matrix isolation spectroscopy can be a valuable tool in studying species and processes relevant to the low-temperature chemistry of the atmospheres. It is clear from the examples discussed here that the photolytic behavior of substances in low-temperature matrices is determined primarily by the cage effect and this must be taken into account when making comparisons with gas phase photolysis studies. However, photolysis under matrix conditions is likely to provide a better model than the gas phase of the effects of photolysis on species in polar stratospheric clouds or aerosols. The matrix technique also provides a means of studying the structure and photochemical behavior of specific molecular complexes, which may prove to be of considerable importance in atmospheric chemistry.

I-52328
Sodeau, J.R., **Photochemistry in and on low temperature solid materials,** NATO Advanced Study Institute on Low-temperature Chemistry of the Atmosphere, Maratea, Italy, Aug. 29-Sep. 11, 1993. Proceedings. Edited by G.K. Moortgat et al and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.21, Berlin, Springer-Verlag, 1994, p.373-388, 32 refs.

DLC QC879.6.L69

This paper considers "atmospheric possibilities" associated with results obtained by the matrix isolation technique, which has long been used for the spectroscopic study of free radicals, reactive molecules and conformational isomerism. The approach taken will be to discuss in detail several "case studies" including polar stratospheric clouds, and is therefore highly selective. It is hoped that each example will provide a lesson for those atmospheric chemists who regularly deal with heterogeneous mechanisms.

I-52362
Turner, J., Thomas, J.P., **Summer-season mesoscale cyclones in the Bellingshausen-Weddell region of the Antarctic and links with the synoptic-scale environment,** *International journal of climatology,* Oct. 1994, 14(8), p.871-894, 32 refs.

Results are presented from the first investigation into a summer season of mesoscale vortex activity in a large sector of the antarctic coastal region. The study is based on an analysis of 3 months' meteorological satellite imagery collected at Rothera Station on the Antarctic Peninsula. The study revealed the high frequency with which such systems occur, with 162 individual vortices being found during the period Dec. 1983 to Feb. 1984 inclusive. The preferred area for their development was in the latitude band 60-70°S over the marginal ice zone and ice-free region of the eastern Bellingshausen Sea. A classification scheme for the vortices was developed based on the relationship with the broad-scale synoptic flow, the sea ice, and the geographical location. The most common type of vortex found was the 'classic' polar low, which formed in the southerly flow to the west of synoptic-scale disturbances. Only 23 of the vortices found were correctly represented on the Meteorological Office analyses and of these 15 were small synoptic disturbances. (Auth. mod.)

I-52393
Lorius, C., Oeschger, H., **Palaeo-perspectives: reducing uncertainties in global change?,** *Ambio,* Feb. 1994, 23(1), p.30-36, 54 refs.

Information on the history of the Earth system is an important element in assessing global change. Analysis of air trapped in natural ice has provided data on the pre-industrial concentrations of greenhouse gases like CO_2 and CH_4, and their recent increase—and has shown that the latter effect can be unequivocally attributed to human activities. Such data also provide the basis for estimating that the present anthropogenic greenhouse forcing is 2.5 W/m^2. Records for the last 150,000 years show the variation of Earth system parameters during one and a half glacial cycles. The frequencies of the orbital forcing indicates that changes in these parameters are the main cause of the glacial-interglacial cycles. The concentrations of CO_2 and CH_4 vary in parallel with global temperature; whilst CH_4 closely follows the climatic variations, the relationship of CO_2 with climate is much more complex. (Auth. mod.)

I-52394
Street-Perrott, F.A., **Palaeo-perspectives: changes in terrestrial ecosystems,** *Ambio,* Feb. 1994, 23(1), p.37-43, 40 refs.

Over the last 25 years, the study of marine cores and ice cores from the Greenland and antarctic ice sheets has yielded spectacular insights into the natural variability of the planetary environment, notably the large glacial/interglacial variations in ice-sheet extent, ocean circulation, greenhouse gases and tropospheric aerosols. This paper focuses on specific examples of state-of-the-art research that highlight the potential contribution of palaeodata to the International Geosphere-Biosphere Programme as a whole. They include: glacial/interglacial changes in carbon storage on land; the feedback effects of variations in atmospheric CO_2 on tropical and high-latitude ecosystems; the climatic mechanisms governing variations in methane generation by tropical wetlands; and the environmental repercussions of human activity during the last 2,000 years, including accelerated soil erosion and acid rain. (Auth. mod.)

I-52397
Roscoe, H.K., et al, **Improvements to the accuracy of zenith-sky measurements of the total ozone by visible spectrometers,** *Journal of quantitative spectroscopy & radiative transfer,* Nov. 1994, 52(5), p.639-648, 5 refs.

Visible spectra of the zenith sky were recorded at Faraday Station during 1990. Line-of-sight ozone amounts were deduced by fitting laboratory cross-sections to the spectra. In order to find the accuracy of the visible-light system for the determination of medium- and long-term trends in ozone, Langley plots of the ozone amounts were examined to determine the stability of the offset to the zero of the ozone measurement. The plots revealed changes which correlated with shifts in wavelength of the spectrometer. This allowed the use of wavelength shift as a surrogate for offset, which is fortunate because the use of Langley plots to determine the offset on an individual day from zenith-sky spectra at high latitudes is unreliable. The standard deviation of the ratios of total ozone measured on the same day at Faraday by the Dobson spectrophotometer and the visible spectrometer was 10%, using offsets calculated from wavelength shifts. This is 4% less than the standard deviation using a straight-line fit to the offsets. Although common for Dobson measurements of ozone in the UV, such Langley-plot analyses are unusual for visible spectrometers, but are essential for future trend determination, even by systems that are inherently more stable. (Auth. mod.)

I-52398
Lee, A.M., et al, **Improvements to the accuracy of measurements of NO_2 by zenith-sky visible spectrometers,** *Journal of quantitative spectroscopy & radiative transfer,* Nov. 1994, 52(5), p.649-657, 11 refs.

Visible spectra of the zenith sky were recorded at Faraday Station during 1990. Line-of-sight NO_2 amounts were deduced by fitting laboratory cross-sections to the spectra. A new procedure was used to determine the offset to the zero of the measurement from the measurement series itself. This offset includes the effect of the reference spectrum—a single reference was used for the whole data set—plus any instrumental or analytic artefacts. In the new procedure, offsets were determined from fits to plots of the measured line-of-sight NO_2 vs calculated air-mass factors, whose curvature had been precomputed from model predictions rather than the straight-line fits of Langley plots. The resulting vertical NO_2 amounts were significantly lower than those deduced using a more subjective determination of offset, particularly in the early spring when denitrification might be expected. (Auth.)

I-52419

Zhang, R.Y., Leu, M.T., Keyser, L.F., **Heterogeneous reactions of $ClONO_2$ HCl, and HOCl on liquid sulfuric acid surfaces,** *Journal of physical chemistry,* Dec. 22, 1994, 98(51), p.13563-13574, 44 refs.

The aim of this work is to perform direct laboratory experiments on liquid sulfuric acid surfaces under stratospheric conditions conducive to the formation of polar stratospheric clouds. The reaction probabilities for $ClONO_2$ hydrolysis and HCl reactions with $ClONO_2$ and HOCl at the reactant concentrations characteristic of the lower stratosphere have been measured. The temperature dependence of these reactions was investigated at a fixed H_2O partial pressure corresponding to a mixing ratio of about 5 ppmv at 100 mb (16 km) and at temperatures from 195 to 220 K. The relative importance or competition between the hydrolysis of $ClONO_2$ and the $ClONO_2$ reaction with HCl was also examined so that accurate chlorine activation processes on the stratospheric sulfate aerosols can be applied and simulated in atmospheric models. Also investigated was the effect of HNO_3 on the reaction probabilities due to the formation of the ternary $H_2SO_4/HNO_3/H_2O$ system, which has been proposed to occur prior to the onset of type I polar stratospheric clouds (PSC). (Auth. mod.)

I-52420

Jouzel, J., et al, **Climatic record from antarctic ice now extends back to 220 kyr BP,** NATO Advanced Study Institute on Long Term Climatic Variations—Data and Modelling, Siena, Italy, Sep. 27-Oct. 11, 1992. Proceedings. Edited by J.C. Duplessy et al and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.22, Berlin, Springer-Verlag, 1994, p.213-237, 48 refs.

The isotopic content of ancient waters (deuterium and oxygen 18) gives a key access to past climatic changes because of the essentially linear relationship that exists between the isotopic content of a precipitation and the temperature of the site (at least for middle and high latitudes). This approach has been extensively used for extracting high resolution climatic records from both antarctic and Greenland ice that now extend beyond 200 kyr BP. Presented here are the Vostok isotope temperature record which has been extended back to 220 kyr BP and the associated glaciological timescale. Differences and similarities between this antarctic record and the new climatic records recently obtained in Central Greenland are discussed. (Auth. mod.)

I-52421

Berger, A., Tricot, C., Gallée, H., Fichefet, T., Loutre, M.F., **Last two glacial-interglacial cycles simulated by the LLN model,** NATO Advanced Study Institute on Long Term Climatic Variations—Data and Modelling, Siena, Italy, Sep. 27-Oct. 11, 1992. Proceedings. Edited by J.C. Duplessy et al and NATO Advanced Science Institutes, Series I. Global Environmental Change. Vol.22, Berlin, Springer-Verlag, 1994, p.411-452, Refs. p.439-444.

A 2-dimensional model which links the atmosphere, the mixed layer of the ocean, the sea ice, the continents, ice sheets in both polar regions and their underlying bedrock has been used to test the Milankovitch theory over the last two glacial-interglacial cycles. It was found that orbital variations alone can induce, in such a system, feedbacks sufficient to generate the low frequency part of the climatic variations over the last 122 kyr. These simulated variations at the astronomical time scale are broadly in agreement with reconstructions of ice-sheet volume and of sea level independently obtained from geological data. Imperfections in the simulated climate were the insufficient southward extent of the ice sheets and the too small hemispheric cooling at the last glacial maximum. These deficiencies were partly remedied in a further experiment by using the time-dependent atmospheric CO_2 concentration given by the Vostok ice core in addition to the astronomical forcing. In this transient simulation, 70% of the Northern Hemisphere ice volume is related to the astronomical forcing and the related changes in the albedo, the remaining 30% being due to the CO_2 changes. Analysis of the processes involved shows that variations of ablation are more important for the ice-sheet response than are variations of snow precipitation. (Auth. mod.)

I-52447

Claffey, K.J., Andreas, E.L., Makshtas, A.P., **Upper-air data collected on Ice Station Weddell,** *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Aug. 1994, 61p., ADA-289 707, 23 refs.

From Feb. to June 1992, as Ice Station Weddell (ISW) drifted through the uncharted western Weddell Sea, the authors launched radiosondes, typically twice a day, to study the structure of the lower atmosphere. Here they describe the ISW radiosounding program, report on the availability of the data, and offer preliminary analyses of some of the atmospheric features observed. For 10 days in late May and early June, as the Russian icebreaker *Akademik Fedorov* approached ISW from the northeast to help remove the ice camp, simultaneous soundings were made four times a day from ISW and from the *Fedorov.* The authors also describe the radiosounding system on the *Fedorov,* report on the availability of these data, and present preliminary comparisons of the simultaneous ISW and *Fedorov* soundings. Soundings showed that temperature inversions were very common in this part of the Weddell Sea in fall and winter. Over 95% of the ISW soundings and 100% of the *Fedorov* soundings showed low-level temperature inversions. Of these, over 40% of the ISW soundings and over 67% of the *Fedorov* soundings were surface-based. A low-level jet in the wind speed profile was also common. Such a jet was found in almost 80% of the ISW soundings for which the authors had wind information. The jet core was usually between 25 and 75 m above the surface, with speeds in the core commonly between 4 and 10 m/s. (Auth.)

I-52459

Hunt, B.G., Gordon, H.B., Davies, H.L., **Impact of the greenhouse effect on sea-ice characteristics and snow accumulation in the polar regions,** *International journal of climatology,* Jan. 1995, 15(1), p.3-23, 56 refs.

An extensive analysis has been made of the simulated sea-ice behavior for current and doubled carbon dioxide levels for both polar regions. The sea-ice variations were computed as a component of the overall performance of a global climatic model. This model simulated the major climatic processes, but used an elementary oceanic representation. For current conditions the sea-ice extent, thickness, seasonal and interannual variability were reasonably simulated, particularly for the Northern Hemisphere. The major deficiency was the lack of regions with very thick sea-ice, which is known to be generated in the real world by dynamical interactions. Very substantial reductions occurred in the sea-ice thickness, and to a lesser extent in sea-ice area, under greenhouse conditions, with the major impact being in summer. Water mass accumulation over the great ice-sheets agreed moderately well with limited observations for control conditions. (Auth. mod.)

I-52478

Köpken, C., Heinemann, G., Chédin, A., Claud, C., Scott, N.A., **Assessment of the quality of TOVS retrievals obtained with the 3I algorithm for antarctic conditions,** *Journal of geophysical research,* Mar. 20, 1995, 100(D3), p.5143-5158, 41 refs.

The quality of layer-mean temperatures and humidities retrieved with the improved initialization inversion (3I) algorithm from measurements of the TIROS operational vertical sounder (TOVS) radiometer was studied for two summer periods in 1987 and 1990 in the Weddell Sea region by means of collocations with radiosoundings, European Centre for Medium-Range Weather Forecasts (ECMWF) analyses and special sensor microwave/imager (SSM/I) retrievals. Appropriate corrections of the atmospheric transmission functions have been used for the two periods. Collocation statistics with radiosoundings for layer-mean temperatures based on 160 cases show very satisfying results. The standard deviation is very close to the deviations expected from collocation errors alone, but an overall negative bias of the retrieved temperatures is observed. Inconsistencies appear in the ability to register varying water vapor contents caused by weak signals under the very dry antarctic conditions. Comparisons of the total water vapor content to results based on SSM/I measurements show a good agreement between the two different instruments and retrieval methods. (Auth. mod.)

I-52479

Schoeberl, M.R., Luo, M.Z., Rosenfield, J.E., **Analysis of the Antarctic Halogen Occultation Experiment trace gas observations,** *Journal of geophysical research,* Mar. 20, 1995, 100(D3), p.5159-5172, 26 refs.

Analysis of the version 16 Halogen Occultation Experiment (HALOE) CH_4 data shows that this long-lived trace gas is well correlated with potential vorticity (PV) computed from National Meteorological Center balanced winds. Late Sep. and Oct. 1992 data show that very low CH_4 values are confined to the interior of a vortex edge defined by the maximum gradient in PV. The CH_4 and HF time tendency is used to estimate the descent rate in the antarctic vortex. After removing a component of the trend correlated with the HALOE sampling pattern, the lower stratosphere vertical descent rates and net heating rates in the spring antarctic vortex are computed. Over the winter season, the overall lower stratospheric descent rate averages about 1.8-1.5 km/month. These computations are in line with radiative transfer estimates of the heating and descent rate. The HALOE data thus appear to be consistent with the picture of an isolated lower stratospheric antarctic vortex. (Auth. mod.)

I-52482

Colacino, M., ed, Giovanelli, G., ed, Stefanutti, L., ed, Italian Research on Antarctic Atmosphere, 5th Workshop, Porano, Oct. 19-21, 1992, **Conference proceedings of the Italian Research on Antarctic Atmosphere, Vol.45,** Bologna, Italian Physical Society, 1994, 369p., Refs. passim. For individual papers see I-52483 through I-52503, K-52504 and K-52505.

This is a collection of papers presented at the 5th Workshop of Italian Research on Antarctic Atmosphere, held Oct. 19-21, 1992, in Porano, Italy. It consists of 25 reports divided into 4 sections: 12 papers dealing with the troposphere, planetary boundary layer and meteorology on a local scale; 3 on instrumentation, highlighting a modular PC-based system for the processing of sodar echoes, a new IR radiometer for ozone total column measurements, and a national data bank; 7 on the stratosphere and ozone depletion; and 3 on the magnetosphere, describing the AGONET program, a network of antarctic stations to measure geospace parameters, geomagnetic studies, and correlation surveys involving the ozone hole and auroral activity.

I-52483

Rasmussen, E.A., **Northern and Southern Hemisphere polar lows: a comparative study,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.3-18, Refs. p.16-18.

Northern Hemisphere "polar lows", i.e. maritime, small, but fairly intense cyclonic systems, have been studied for more than two decades. Recently researchers have turned their attention to the occurrence of polar lows and other small-scale cyclonic disturbances in the Southern Hemisphere. In this paper, a short account of present knowledge of Northern Hemisphere polar lows is given, followed by some preliminary results of an investigation of the nature and occurrence of polar lows in the Southern Hemisphere. (Auth.)

I-52484

Meneguzzo, F., Frustaci, G., Giarola, S., Clerici, G., Bacci, G., **Mesoscale diagnostic numerical modelling for a complex topography antarctic area,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.19-49, Refs. p.46-49.

Various activities, both logistic and scientific, at Terra Nova Bay Station require knowledge of high-resolution accurate three-dimensional wind fields. These activities include comprehensive real-time interpretation of sparse surface and upper level meteorological data for general routine forecasts and for assistance to helicopter flight activity; detailed statistical characterization of local and mesoscale circulation; searching for reliable correlations between airflow features and precipitations; and real-time or statistical characterization of trajectories of air masses to study local pollution or nature and origin of aerosols. The authors applied an efficient mesoscale irrotational diagnostic numerical model to reconstruct three-dimensional wind fields in the area for two case studies. Some applications are shown and some are discussed. (Auth.)

I-52485

Frustaci, G., Bacci, G., Pellegrini, A., **Analysis of summer tropospheric radiosounding and surface synoptic data for antarctic station 89662, Terra Nova Bay,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.51-86, 9 refs.

Radiosonde and surface synoptic data collected during the last four antarctic summers at Terra Nova Bay have been analyzed in order to characterize the main features of the tropospheric flow in Victoria Land. Correlation and cluster analysis show the feasibility of a preliminary definition of some typical weather types in terms of wind speed and direction, temperature, humidity, geopotential height or pressure both at surface and at standard tropospheric levels. (Auth. mod.)

I-52486

Vitale, V., Tomasi, C., **Correction procedure for determining the vertical profiles of absolute humidity from the radiosounding measurements taken in the antarctic atmosphere,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.87-118, 15 refs.

A set of meteorological measurements obtained by more than 500 radiosoundings performed at Terra Nova Bay Station during 5 experimental campaigns from 1987 to 1991 was analyzed to determine the mean characteristics of the vertical distribution curves of temperature and absolute humidity from mid-Nov. to mid-Feb. The vertical profiles of absolute humidity derived from HUMICAP sensor measurements were extended up to 25 km height, assuming fixed values of the mixing ratio at the 15, 10 and 25 km levels. The vertical curves of air pressure, temperature, dew-point, absolute humidity and other moisture parameters obtained through these procedures were divided into diurnal and nocturnal sub-sets for each 15 day period. Results show that the tropospheric temperature increases appreciably from mid-Nov. to mid-Jan., and decreases slightly during the following period, while the average temperature gradient varies between -6.2 and -5.5°K/km. (Auth. mod.)

I-52487

Baldi, M., Dalu, G.A., Sbano, L., Colacino, M., **Behavior of the atmospheric outflow in the near coastal regions of Antarctica on a climatological scale,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.119-131, Refs. p.130-131.

Using Gauss' divergence theorem, the authors examine the role of the net radiative cooling, and of the entrainment of potentially warm air from the free atmosphere into the surface layer, in determining the intensity of the cold air outflow at the rim of the antarctic continent. Results show that a large amount of cold air, significant at a global climatological scale, is exported through this process from high to low latitude regions. Further observations show that katabatic winds in the near-coastal region can be periodic or continuous, or can stay a long time in a quiescent near-critical state, to burst in short and strong gusts. Some aspects of these katabatic winds are examined in terms of the mesoscale energy theory developed by Dalu and Green. This complex behavior is described by a nonlinear system, where the relevant parameter is the Froude number of the inflow at a Rossby radius distance from the coast. (Auth. mod.)

I-52488

Mittner, P., Ceccato, D., Del Maschio, S., **Multielemental characterization of aerosol at Terra Nova Bay. (II). Preliminary results on the coarse fraction during the 1990-91 austral summer,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.133-

143, 18 refs.

Aerosol sampling was performed at Campo Icaro, in the vicinity of Terra Nova Bay Station, between Nov. 1990 and Feb. 1991. The duration of the sampling intervals was approximately 12 hrs and a special aerosol sampler was used, with separation of the coarse from the fine fraction. The authors present the aims and methods of the experiment as well as the results of a PIXE analysis of 51 samples of the coarse fraction, collected on Nuclepore filters. Mean values and standard deviations of volume concentrations (ng/m^3) for the following elements: Al, Si, S, Cl, K, Ca, Ti, Mn, Fe, Ni, Cu, Zn, and Br, are given. (Auth.)

I-52489

Allegrini, I., Montagnoli, M., Sparapani, R., **Measurement of gas phase and particulate matter tropospheric components in Antarctica,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.145-157, 12 refs.

Measurements of trace tropospheric components were carried out at Terra Nova Bay Station during summer 1990-91 by a combination of annular denuders and filter packs, which allow the selective collection of several species in gas phase and particulate matter. The determination relies on ion chromatographic techniques. Data on natural radioactivity are reported with the concentration trends of many components, such as sulfur dioxide and nitric acid in gas phase, and nitrates and chlorides in particulate matter. The sampling equipment is described in terms of reliability, accuracy and precision of field measurements. Results show a distinct pattern of nitrogen-containing particles, especially ammonium nitrate, and show the suitability of the proposed technique for the collection of field data in remote sites for the study of chemical processes in the troposphere as well as relevance to the global change issue. (Auth.)

I-52490

Ciccioli, P., Cecinato, A., Brancaleoni, E., Montagnoli, M., Allegrini, I., **Chemical composition of particulate organic matter (POM) collected at Terra Nova Bay in Antarctica,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.159-180, 13 refs.

The organic composition of particulate matter collected at Terra Nova Bay Station during the 1991 Italian Expedition to Antarctica was determined by HRGC-MS. Several biogenic and anthropogenic organic compounds were identified in the liquid chromatographic fractions into which the extract was separated. In addition to n-paraffins, PAH and phtalate esters, alkanoic acid methyl esters, alkyl phosphates and arylsulphonamides were identified as major components in the particulate organic matter. The results obtained are highly indicative of the decisive role played by marine aerosols in determining the levels of organic compounds present in suspended particles in Terra Nova Bay. (Auth.)

I-52491

Corazza, E., Tesi, G., **Two seasons of hydrogen and carbon monoxide observations at Terra Nova Bay (Antarctica),** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.181-191, 15 refs.

Hydrogen and carbon monoxide were measured continuously at Terra Nova Bay Station during two austral summers (1989-90 and 1990-91). Average concentrations of 528±25 and 522±7 ppbv respectively were found for H_2, and of 51±2 and 51±1 ppbv respectively for CO. In the first season, some sharp hydrogen peaks were observed, which did not appear in the second. CO also showed local pollution influences (base and/or ship) in the first campaign; in the second, a brief increase of its concentration was attributed to local pollution (ship?). The wind direction dependence of the CO concentration found in the first season was not evident the next year due to homogeneous values. These differences are attributed to different meteorologic circulation patterns from one year to another, with different origin of the air masses. The average concentration of CO represents a planetary background, and is close to the absolute minimum observed at the South Pole and the South Pacific Ocean. The average H_2 concentration is representative of an even worldwide distribution for the given season. (Auth. mod.)

I-52492

Cini, R., Degli Innocenti, N., Loglio, G., Stortini, A.M., Tesei, U., **Further evidence of marine organic matter transport in antarctic snow via air-sea exchange,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.193-206, 9 refs.

A comparison of marine aerosol components concentration in different antarctic snow samples is reported. Further evidence of biogenic fluorescent matter associated with marine aerosol transport is given. The marine humic nature of examined organic matter is confirmed by IR-FT analysis. The variation of the ratio between the HS concentration (humic substances) and Cl-concentrations, for coastal snow samples taken at different height above the sea, is discussed in terms of the selected dimensional distribution with height during the transport events, according to the models of McIntyre and Blanchard on aerosol formation. (Auth.)

I-52493

Lenaz, R., Anav, A., Bonasoni, P., Giovanelli, G., Gasparotto, G., Gasperini, L., **Continuous trans-Atlantic and Pacific meteorological and climatic measurements in both hemispheres,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.207-215, 19 refs.

Data of tropospheric trace gases and airborne particles, recorded during the 5th Italian Antarctic Expedition in 1990-91 aboard the R/V *OGS Explora,* enabled the authors to calculate the life span of ozone and to compare patterns in both hemispheres. The qualitative and quantitative composition of airborne particles was determined. A comparison of the latitude trends of several meteorological parameters and solar radiation is also presented. Extending these measurements beyond the antarctic circle should enable the distribution of ozone and other trace gases near the antarctic continent to be measured in order to determine the accuracy of the concentration patterns for surface ozone distribution generated by models. At the same time, the sampling of atmospheric particles should further elucidate airborne transport phenomena via the circumantarctic belt and the amount of remote wind-borne supply to antarctic marine sediments. (Auth. mod.)

I-52494

Zibordi, G., Van Woert, M.L., **Detection of clouds over polar oceans from AVHRR daylight images,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.217-223, 18 refs.

A cloud detection scheme based on Advanced Very High Resolution Radiometer (AVHRR) data from the National Oceanic and Atmospheric Administration (NOAA) polar orbiting satellites has been developed and applied to daylight images taken over arctic and antarctic seas. After masking the continent and ice shelves, clouds are discriminated from sea ice and open sea using thresholds applied to the multidimensional space formed by AVHRR channels 2, 3 and 4 radiances. Results based on the analysis of more than 75 images show that the proposed scheme is capable of properly discriminating clouds from sea ice and open sea under most conditions. (Auth.)

I-52495

Mastrantonio, G., Argentini, S., Viola, A., **New PC-based real time system to analyze sodar echoes,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.227-235, 3 refs.

A modular PC-based system for the processing of sodar echoes is presented. The advantage of this system lies in the possibility of instantaneous data recording and in the capability of an easy handling of the large amount of data this instrument is able to provide. Compact representations of data are possible, such as daily facsimile records in A4 format if a laser printer is available. Facsimiles as well as wind profiles may be obtained as TIFF or PIC files respectively, so that they can be easily merged with texts by using most of the recent word processors or publishers. The new system can also operate as a double band Doppler sodar. Equipment of the type described has been used by Mastrantonio et al. in Victoria Land. (Auth.)

I-52496

Biagioni, S., et al, **On-line South Pole directory: first goal of the Italian Antarctic Data Exchange Project,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.237-242, 4 refs.

The main steps in the realization of the Directory of Italian research in Antarctica are shown. The South Pole Directory is now available on-line via SPAN, Internet and other networks. The first phase of the Italian Antarctic Data Exchange project may be now considered at an end, and the second is under way. (Auth.)

I-52497

Dall'Oglio, G., Dalu, G.A., Pietranera, L., Pizzo, L., **Infrared radiometer for ozone column density measurements,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.243-250, 6 refs.

The authors describe a feasibility study for measurements in the 8-12 μm region of ozone integrated column amount. Preliminary data show the feasibility of this kind of measuring technique. A particularly favorable application could be ozone monitoring during the antarctic winter and early spring. An infrared instrument in such conditions should achieve its best performance due to the low level of water vapor in the atmosphere. (Auth. mod.)

I-52498

Pitari, G., Ricciardulli, L., **Preliminary results for the interactive formation and growth of sulfate, NAT and ice particles in a photochemical 2D model,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.259-282, Refs. p.280-282.

The authors present a comprehensive study of sulfur, aerosol and polar stratospheric clouds (PSC) in a photochemical two-dimensional (2D) model where full interaction is allowed between gases and particles. A rather simple scheme is described for nucleation and condensation processes leading to the formation and growth of NAT and ice particles, still using grid point temperature data taken from the zonally averaged climatology of the lower stratosphere. Model results for the aerosol size distribution and for the available surface densities appear reasonable when compared to satellite and balloon measurements and to independent numerical calculations. Data for the Southern Hemisphere to 90°S are included. (Auth. mod.)

I-52499

Godin, S., David, C., Stefanutti, L., Del Guasta, M., Morandi, M., **Ozone and aerosols lidar measurements in 1991 and 1992 in Dumont d'Urville,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.283-294, 7 refs.

In the beginning of 1991, a new lidar system intended to measure both aerosols and ozone profile was installed at Dumont d'Urville Station, the ozone measurements being performed according to the DIAL method. The results after 18 months of operation of the system, concerning stratospheric ozone and aerosols on this particular site located at the edge of the polar vortex, are presented here, with special attention given to the winter and spring periods, characterized by the appearance of polar stratospheric clouds and depleted ozone levels. The description of the evolution of the stratosphere during these periods is completed by comparison with other routine measurements performed at Dumont d'Urville, such as ECC ozonesonde profiles and total ozone content obtained with SAOZ UV-Visible spectrometer measurements, in connection with the eruptions of Mount Pinatubo and Mount Hudson. (Auth. mod.)

I-52500

Morandi, M., Del Guasta, M., Matthey, R., Sacco, V.M., Stefanutti, L., **Multiwavelength and depolarization stratospheric lidar measurements: a procedure to determine optical parameters and particle size distribution,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.295-315, 8 refs.

A method to derive particle size and optical parameters of stratospheric aerosol by means of a multiwavelength depolarization lidar is described. The method has been applied to a lidar system operating during the European Arctic Stratospheric Ozone Experiment (EASOE) in Sodankylä in northern Finland, in a cooperation among the Freie Universität Berlin, SA-CNRS, Observatoire Cantonal Neuchatel, Università de' Aquila and IROE-CNR. The evaluated Pinatubo particle sizing has been used for the aerosol correction necessary to retrieve ozone vertical distribution from the lidar signal measured at Dumont d'Urville Station. (Auth. mod.)

I-52501

Di Donfrancesco, G., Adriani, A., Gobbi, G.P., **1992 late winter observations of polar stratospheric clouds and middle atmosphere temperatures at McMurdo Station, Antarctica,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.317-321, 6 refs.

Late winter studies of polar stratospheric clouds (PSCs) have been in progress since 1990 at McMurdo Station. Middle atmosphere temperatures have been measured by lidar since 1991. In 1992, PSCs were detected in two major events, on Aug. 26 and Sep. 9. These and stratospheric temperature observations are summarized in this paper, with a general overview of the meteorological and climatic context in which the phenomena took place. (Auth.)

I-52502

Anav, A., Ciattaglia, L., Guerrini, A., Valenti, C., **Use of Brewer #035 and #050 in Antarctica,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.333-338.

Ozone measurements carried out at the Scott Base and Belgrano II and Marambio stations with Brewer and Dobson instruments in 1989, 1990 and 1992 are discussed. The data are presented in figures.

I-52503

Marcucci, F., Candidi, M., Orsini, S., Storini, M., **Southern ozone hole and auroral activity,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.341-350, 16 refs.

The ozone daily average total content maps obtained for the years 1980-1985 (Aug. to Nov.) by the TOMS instrument on Nimbus-7, as available from the NASA Climate Data System at NSSDC, are correlated with the AE index time series. Possible auroral influences on the dynamics of the Southern Hemisphere ozone hole are investigated. The value of the correlation coefficient and the distribution of experimental points in the scatter plots show that auroral activity is a factor in the decrease of polar ozone, even if it is not the main contributor to such dynamics. Possible mechanisms for the interaction are discussed. (Auth.)

I-52508

Peil, S., Seisel, S., Schrems, O., **FTIR-spectroscopic studies of polar stratospheric cloud model surfaces: characterization of nitric acid hydrates and heterogeneous reactions involving N_2O_5 and HBr,** *Journal of molecular structure,* Mar. 15, 1995, Vol.348, European Congress on Molecular Spectroscopy, 22nd, Essen, Germany, Sep.11-16, 1994. Proceedings, pt.B, p.449-452, 6 refs.

FTIR spectroscopy has been applied to study model surfaces and processes on cold surfaces which are related to the role of polar stratospheric clouds (PSCs) in ozone depletion in polar regions. Thin solid films of nitric acid hydrates were prepared by deposition of gas-phase HNO_3 and H_2O on a cold substrate. Hydrates of HNO_3 have been found to be major components of PSCs (type I). In this investigation the mono- and dihydrate as well as the two modifications of nitric acid trihydrate, α- and β-NAT, were obtained and characterized by their FTIR spectra. The heterogeneous reaction between gas-phase H_2O and solid ionic N_2O_5 leads to the formation of both the α- and β-modifications of NAT. Gas-phase HBr is hydrolized on the surface of a water ice film resulting in the formation of amorphous and crystalline hydrogen bromide monohydrates. (Auth.)

I-52512

Manney, G.L., Froidevaux, L., Waters, J.W., Zurek, R.W., **Evolution of microwave limb sounder ozone and the polar vortex during winter,** *Journal of geophysical research,* Feb. 20, 1995, 100(D2), p.2953-2972, 35 refs.

The evolution of polar ozone observed by the Upper Atmosphere Research Satellite Microwave Limb Sounder is described for the Northern Hemisphere (NH) winters of 1991-1992, 1992-1993, and 1993-1994 and the Southern Hemisphere (SH) winters of 1992 and 1993. Interannual and interhemispheric variability in polar ozone evolution are closely related to differences in the polar vortex and to the frequency, duration and strength of stratospheric sudden warmings. Ozone in the midstratospheric vortices increases during the winter, with largest increases associated with stratospheric warmings and a much larger increase in the NH than in the SH. The SH vortex remains strong throughout the stratosphere during wintertime warmings, and ozone increases only below the mixing ratio peak, due to enhanced diabatic descent. Ozone mixing ratios decrease rapidly in the lower stratosphere in both SH late winters, as expected from chemical destruction due to enhanced reactive chlorine. (Auth. mod.)

I-52513

Herman, J.R., et al, **Meteor 3/total ozone mapping spectrometer observations of the 1993 ozone hole,** *Journal of geophysical research,* Feb. 20, 1995, 100(D2), p.2973-2983, 26 refs.

The development of the springtime (Sep.-Nov.) antarctic ozone hole was observed by the Meteor 3/total ozone mapping spectrometer (TOMS) to result in the lowest ozone value, 85 DU (Dobson units) on Oct. 8, 1993, ever measured by TOMS. During late Sep. and early Oct. the region of extremely low ozone values was centered on the geographical pole between 85°S and 90°S. The geographical extent of the ozone hole region, the area within the 220-DU contour, reached a maximum during the first week in Oct. at a near-circular area covering 24 x 10^6 km^2 reaching to the southern tip of South America. This approximately matched the 1992 area record. After the maximum area was reached in early Oct., the 1993 ozone hole region remained significantly larger than during 1992 throughout the remainder of the month of Oct. The very low ozone values over the antarctic continent have been confirmed by independent ground-based data. Unlike 1992, the formation of the 1993 antarctic ozone hole does not coincide with unusually low ozone values observed over most of the globe for the past 2 years. The most recent ozone data from Meteor 3/TOMS show that there has been a recovery at all latitudes from the extraordinarily low values observed during 1992 and part of 1993 after the June 1991 eruption of Mount Pinatubo. (Auth. mod.)

I-52514

Emmons, L.K., Shindell, D.T., Reeves, J.M., De Zafra, R.L., **Stratospheric ClO profiles from McMurdo Station, Antarctica, spring 1992,** *Journal of geophysical research,* Feb. 20, 1995, 100(D2), p.3049-3055, 20 refs.

Described here are ground-based measurements of ClO made at McMurdo Station during Sep. and Oct. 1992. Vertical profiles were retrieved from molecular rotational emission spectra at 278 GHz. Peak mixing ratios of 1.6 ppbv were seen in mid-Sep. at approximately 18 km altitude, suggestive of somewhat larger quantities than were measured at the same site and season in 1987. As the core of the polar vortex moved away from McMurdo by early Oct., the ClO mixing ratio at this altitude dropped to less than 0.2 ppbv, coincident with increasing temperature, ozone, and NO_2. A diurnal variation of ClO was also observed. The lower stratospheric layer from 15 to 27 km was found to reach approximately midday abundance by 2-3 hours after sunrise. The column abundance in this layer began to decrease in the period 4-2 hours before sunset and had declined to approximately one quarter of its midday value by 2-0 hours before sunset. In contrast, the ClO column in the upper stratosphere, from 28 to 50 km, built up slowly until midday and remained large while sunlight persisted. (Auth. mod.)

I-52517

Heinze, C., Broecker, W.S., **Closing off the southern ocean surface,** *Paleoceanography,* Feb. 1995, 10(1), p.49-58, 28 refs.

Equilibrium integrations with the three-dimensional Hamburg ocean carbon cycle circulation model show the effect of a southern ocean surface outcrop that is closed off for gas exchange with the atmosphere and export production of particulate organic carbon and $CaCO_3$ south of 32.5°S. For such a close-off, the northern Atlantic outcrop assumes a greater degree of control of atmospheric CO_2 partial pressure. Contrary to expectations, the atmospheric pCO_2 increases compared to a control run without close-off. Maximizing the nutrient utilization in the North Atlantic can compensate for this increase. However, it does not draw down the pCO_2 to glacial levels. (Auth.)

I-52518

Caricchia, A.M., et al, **Determination of PAH in atmospheric particulates in the area of the Italian base in Antarctica: report on monitoring activities during the last three scientific expeditions,** *Environmental pollution,* 1995, 87(3), p.345-356, 37 refs.

Concentrations of polycyclic aromatic hydrocarbons (PAH) in atmospheric particulates have been determined in the frame of the control activities for environmental protection during the VI (1990-91), VII (1991-92) and VIII (1992-93) Italian expeditions in Antarctica. Samples were collected at the four cardinal points at about 200 m from the central area of the Italian scientific base. Data show low levels of the individual PAH (95% in the range 1-50 pg/m^3), confirming the absence so far of significant contamination from the base. These results could be used as a reference for the assessment of air pollution due to combustion sources present in the base. Any possible variation in the base's activities in the future should be analyzed and evaluated with respect to these findings. (Auth.)

I-52524

Von Detten, Y., Egger, J., **Topographic wave modification and the angular momentum balance of the antarctic troposphere, Part II: baroclinic flows,** *Journal of the atmospheric sciences,* Nov. 15, 1994, 51(22), p.3351-3359, 22 refs. For Part I of this study, see 20I-46423.

It has been demonstrated in Part I of this paper that synoptic-scale waves propagating around Antarctica are modified by the antarctic topography such that they transport westerly angular momentum out of Antarctica. The results of Part I are based on a quasi-barotropic wave-mean flow interaction model where the mean flow equations are averaged over the antarctic domain. Frequency and wavelength of the waves are prescribed according to observations. Here many of the constraints imposed in Part I are relaxed. The model atmosphere is now fully three-dimensional and extends from the South Pole to 30°S. A wave perturbation is inserted in the baroclinic zone to the north of Antarctica. Initially the wave grows due to baroclinic instability, while cooling at the slopes induces downslope winds. After an initial phase of intensification the slope wind regime begins to decay, while the maturing depression moves toward Antarctica. However, the circulation of this occluding low is altered by the antarctic topography such that substantial northward transport of angular momentum is induced over Antarctica. (Auth.)

I-52571

Abe, T., Iwamoto, M., Sukegawa, Y., Inayoshi, H., Aono, M., **Meteorological observations at Syowa Station and Asuka Station in 1991 by the 32nd Japanese Antarctic Research Expedition,** *Antarctic record,* 1994, 38(3), p.268-321, In Japanese with English summary. 13 refs.

Results of meteorological observations carried out by JARE-32 from Feb. 1, 1991, to Jan. 31, 1992, are discussed and shown in tables. Radiation data, including ultraviolet-B radiation, were obtained at Showa Station; at Asuka Station, aerological observations were carried out. The number of blizzards at Showa was 34; at Asuka, 82; the annual total sunshine duration was 1,684.9 hours; the ozone hole was observed during 3 successive years, with the lowest daily total ozone value of 159 m atm-cm recorded on Sep. 30. (Auth. mod.)

I-52572

Hirasawa, N., Yamanouchi, T., Ejiri, M., **Report on Workshop "Use of a Multi-Purpose Satellite Data Receiving System at Syowa Station" and "Study on the Polar Atmosphere and Hydrosphere Using Satellite Data with Surface Validation Observations",** *Antarctic record,* 1994, 38(3), p.322-328, In Japanese with English summary. 1 ref.

The purposes of this workshop were as follows: to discuss algorithms to derive parameters of the polar atmosphere and hydrosphere comparing data and surface observations; and to select the satellites to be received at Showa Station through discussion about their sensors and the orbital elements. The contents of the workshop include analysis of the character of the ice sheet surface by NOAA or DMSP, detection of sea ice distribution by ERS or JERS, detection of cloud by NOAA multi-channel radiation data, and effect of clouds on radiation budget. (Auth. mod.)

I-52587

Shumilov, O.I., Kasatkina, E.A., Henriksen, K., Raspopov, O.M., **Ozone "miniholes" initiated by energetic solar protons,** *Journal of atmospheric and terrestrial physics,* May 1995, 57(6), p.665-671, 29 refs.

In this study it is shown that during four solar proton events (SPE) (May 1990, Sep. and Oct. 1989, and Mar. 1989) inside the polar cap in the Arctic (or the Antarctic), short-term depletions were observed (up to 20%) in the ozone total content. These depletions, or so-called ozone "miniholes", seem to be caused by energetic solar protons with energies of 150-300 MeV. For May 1990, the gas phase photochemical model includes only 1% ozone depletion compared with 18% observed at Barentsburg (Svalbard), and for none of the other events can homogeneous processes explain the observed depletion. The problem seems to be solved by considering heterogeneous reactions in the presence of increased amounts of aerosol particles in the stratosphere which may be triggered by penetrating solar protons, or through an additional decrease of temperature, or through an increase of volume electric charge in the stratosphere or troposphere. (Auth.)

I-52600

Japanese Antarctic Research Expedition, **Antarctic meteorological data. Vol.34. Meteorological data at Syowa Station in 1993,** Tokyo, Japan Meteorological Agency, 1994, 324p.

This set of 1993 data collected at Showa Station includes surface reports comprised of monthly and daily summaries and synoptic data; aerological data comprised of monthly summaries and upper air observations; global solar radiation measurements comprised of monthly summaries and hourly readings; atmospheric turbidity measurements comprised of monthly and daily summaries; total ozone, vertical ozone and long wave radiation data; sunphotometer data on the icebreaker *Shirase*, and surface synoptic data on the route from Showa Station to Dome F, with explanatory notes for interpretation of tables and on instruments and observation techniques.

I-52601

Keller, L.M., Weidner, G.A., Stearns, C.R., Whittaker, M.T., **Antarctic automatic weather station data for the calendar year 1993,** Madison, University of Wisconsin, 1995, 473p.

A network of automatic weather station (AWS) units is deployed to collect antarctic surface weather observations in support of specific meteorological research projects as well as operational activities at McMurdo Station. The 1993 network consisted of 39 installed AWS units providing observations on the Ross Ice Shelf, east of the Transantarctic Mountains and north of McMurdo to the Adélie Coast, along the Antarctic Peninsula and at climatological locations such as the South Pole. Each unit measures air temperature, wind speed, and wind direction at a nominal height of 3 m, and air pressure at the electronics enclosure. Some AWS units also measure the relative humidity at 3 m and vertical air temperature difference between 0.5 and 3 m.

I-52616

Tellefsen, O., **Ice age mechanics,** Newark, CA, Olaf Tellefsen, 1992, 91p., WDCA 93000226, 2nd edition, updated and expanded. Refs. passim.

It is argued that the generally accepted theory that ice ages in the northern and southern hemispheres are synchronous is false, and that instead, they oscillate, that is, when it is abnormally cold in the Northern Hemisphere, it is abnormally warm in Antarctica. Between 18,000 and 10,000 years ago, the Atlantic side was shifted about 10 degrees north, North America poleward, and South America equatorward. It was abnormally cold in the northern Atlantic and abnormally warm in Antarctica. By 10,000 years ago, the northern ice load had grown to the extent that it upset the Earth's spin equilibrium and forced a displacement of the Earth's crust on the Atlantic side about 10 degrees southward so that at present, the Northern Hemisphere is experiencing an interglacial period and Antarctica is in the midst of a full-fledged ice age, hence we are still in the Pleistocene.

I-52621

Saltzman, B., Verbitsky, M., **Late Pleistocene climate trajectory in the phase space of global ice, ocean state, and CO_2: observations and theory,** *Paleoceanography,* Dec. 1994, 9(6), p.767-779, 58 refs.

Under study here is the evolution of three main slow-response variables describing the state of the climate system as measured, respectively, by the SPECMAP $\delta^{18}O$ record, the Vostok CO_2 record, and the North Atlantic sea surface temperature record at 50°N (core K708-1), which is coherent with other ocean state properties. Their coevolution is portrayed in the form of a trajectory in the phase space of the three variables and its projections on its three phase planes. The oscillatory nature and phase lags of the variables are clearly illustrated, suggesting a "physical process" scenario that can account for the observations. The basic element of this scenario is a free, near-100 kyr-period oscillation driven by internal instability, involving feedbacks among all three variables under the influence of Earth-orbital (Milankovitch) forcing and long-term tectonic CO_2 forcing. It is shown that a phenomenological theory advanced by the authors, emphasizing the role of CO_2, provides a credible account of the phase-space trajectory. (Auth.)

I-52623

Beaufort, L., **Climatic importance of the modulation of the 100 kyr cycle inferred from the 16 m.y. long Miocene records,** *Paleoceanography,* Dec. 1994, 9(6), p.821-834, 47 refs.

Two detailed and continuous 16 m.y. long Miocene records of paleoceanographic significance are analyzed to study the dynamics of the 100 kyr cycle. One record is interpreted as reflecting migrations of the antarctic polar front through time. The record of the wet-bulk density in the same section, which is interpreted as reflecting variations of paleoproductivity, constitutes the second 16 m.y. record. The two series reveal the presence of a 100 kyr cycle during the Miocene. This cycle is not stable over time and shows similar variations in both series. The amplitude of the 100 kyr cycle fluctuates quasi-periodically with primary periods close to 2.38, 1.14, and 0.8 m.y., equivalent to those of the modulation of the orbital parameters (obliquity and eccentricity). In addition, the amplitude of the 100 kyr cycle is stronger during cooler times. The interactions between climate and modulation of the eccentricity or the obliquity cycles are good indicators which explain that change in amplitude. It is concluded that the long term modulation of the orbital parameter has a significant influence on global climate. (Auth. mod.)

I-52632

Pitts, M.C., Thomason, L.W., Chu, W.P., **Evolution of Pinatubo and Cerro Hudson aerosol over the Antarctic during the 1991 austral spring,** *Technical digest series,* 1993, Vol.5, Optical Remote Sensing of the Atmosphere. Topical Meeting, Salt Lake City, UT, Mar. 8-12, 1993. Postconference edition, p.288/ThA3-1-ThA3-4/291, 11 refs.

DLC QC878.5.O78

The eruption of Mt. Pinatubo on June 15, 1991 injected large amounts of SO_2 into the stratosphere as high as 30 km. Substantial amounts of aerosol were transported to the mid-latitudes of both hemispheres, and by early Sep., satellite observations indicated a layer of Pinatubo aerosol centered near 21 km had reached as far south as the outer edge of the antarctic polar vortex. In addition, the Cerro Hudson volcano in southern Chile erupted intermittently from Aug. 12-15, 1991, sending significant amounts of SO_2 into the lower stratosphere. At the onset of the 1991 austral spring, two distinct volcanic aerosol clouds were present in the stratosphere over the polar regions of the Southern Hemisphere. In this study, the authors use SAM II and SAGE II data to identify and track the movement of these volcanic clouds and study transport processes associated with the antarctic polar vortex during the spring.

I-52633

Russell, J.M., III, Gordley, L.L., Park, J.H., Drayson, S.R.,

HALOE observations of ozone, halogen, nitrogen, and hydrogen compounds made from the UARS Platform, *Technical digest series,* 1993, Vol.5, Optical Remote Sensing of the Atmosphere. Topical Meeting, Salt Lake City, UT, Mar. 8-12, 1993. Postconference edition, p.342/ThD3-1-ThD3-4/345, 1 ref.

DLC QC878.5.O78

The Halogen Occultation Experiment (HALOE) was launched Sep. 12, 1991 by the Space Shuttle Discovery into a 57°, 585 km, near-circular orbit onboard the Upper Atmosphere Research Satellite (UARS). The experiment was allowed to outgas for about 1 month before science observations began on Oct. 11, 1991. The experiment approach is solar occultation. The data set will be used to pursue a number of scientific investigations, including stratospheric photochemistry and dynamics studies, evaluation of the impact of natural versus anthropogenic chlorine sources on total chlorine, the effect of volcanic aerosols on the chemistry, and study of antarctic processes which occur during the ozone hole development and recovery phases. It is concluded that the quality of the HALOE data is very good and will allow all scientific objectives to be met.

I-52651

Barnola, J.M., Anklin, M., Porcheron, J., Raynaud, D., Schwander, J., Stauffer, B., **CO_2 evolution during the last millennium as recorded by antarctic and Greenland ice,** *Tellus,* Feb.-Apr. 1995, 47B(1-2), p.264-272, 26 refs.

In order to study in detail the pre-industrial CO_2 level (back to about 900 AD) and its temporal variations, several ice cores from Greenland and Antarctica were analyzed in two laboratories, and compared with previous records. The agreement between the two laboratories and between the different cores of the same hemisphere is good. However, comparison of Greenland and Antarctica records shows values systematically higher in the north than in the south, ranging from 20 ppmv at the turn of this millennium to nearly zero around the 18th century. Based on the present knowledge of the carbon cycle, an inter-hemispheric gradient of 20 ppmv is unrealistic. Thus, in the oldest part of the record, at least one profile must not represent the true atmospheric CO_2 concentrations. The new results from D47 and D57 (Adélie Land) presented in this paper confirm the CO_2 fluctuation of about 10 ppmv at the end of the 13th century, previously observed by Siegenthaler et al. (1988) on an ice core drilled at the South Pole. (Auth. mod.)

I-52652

Johnson, B.J., Deshler, T., Zhao, R., **Ozone profiles at McMurdo Station, Antarctica during the spring of 1993; record low ozone season,** *Geophysical research letters,* Feb. 1, 1995, 22(3), p.183-186, 11 refs.

Record low ozone was measured by balloon-borne ozonesondes (40 flights) at McMurdo Station during the 1993 austral spring. Total column ozone declined by 55% from an initial 275 Dobson Units (DU) on 30 Aug. to a minimum of 130 DU on 2 Oct. Ozone within the 12-20 km showed a 95% decrease from an initial 138 DU in Aug. to a record low 7 DU on 19 Oct. Probable causes of the 1993 record low ozone include: the presence of the Pinatubo volcanic aerosol layer between 11 and 16 km (though decreased from the 1992 season); a colder than normal stratosphere over McMurdo (183 K minimum); and a relatively stable polar vortex which delayed the intrusion of high levels of ozone from outside the polar vortex wall until after 22 Oct. These conditions provided an optimum environment for the formation of polar stratospheric clouds (PSCs), essential to the heterogeneous chemistry that subsequently leads to the catalytic destruction of ozone by reactive chlorine. (Auth.)

I-52653

Luo, B.P., Carslaw, K.S., Peter, T., Clegg, S.L., **Vapour pressures of $H_2SO_4/HNO_3/HCl/HBr/H_2O$ solutions to low stratospheric temperatures,** *Geophysical research letters,* Feb. 1, 1995, 22(3), p.247-250, 18 refs.

Vapor pressures of H_2O, HNO_3, HCl and HBr over supercooled aqueous mixtures with sulfuric acid have been calculated using an activity coefficient model for $185 K<T<235 K$ and assuming HCl and HBr to be minor constituents. Predicted vapor pressures agree well with most laboratory data, and give confidence in the validity of the model. The results are parameterized as simple formulae, which reproduce the model results to within 40% and cover the entire stratospherically relevant range of composition and temperature. The study is pertinent to polar stratospheric clouds. (Auth. mod.)

I-52654

Graham, J.D., Roberts, J.T., **Interaction of HCl with crystalline and amorphous ice: implications for the mechanisms of ice-catalyzed reactions,** *Geophysical research letters,* Feb. 1, 1995, 22(3), p.251-254, 22 refs.

To study the formation of polar stratospheric clouds, the interaction of HCl with ice under ultrahigh vacuum has been studied using temperature programmed desorption and single reflection Fourier transform infrared spectroscopy. Both amorphous and crystalline ice were investigated. At 120 K, HCl is initially absorbed by ice to form a stoichiometric hydrate phase identified as $HCl{\cdot}6H_2O$. Upon completion of the bulk phase, HCl is adsorbed to the surface. This initial HCl adsorption probability on crystalline ice is ≈60% of that on amorphous ice. Furthermore, the adsorption probability on crystalline ice decreases more rapidly with increasing HCl uptake. As a result, $HCl{\cdot}6H_2O$ is more rapidly formed in amorphous ice. The difference in adsorption probabilities is tentatively attributed to a lower coverage of dangling OH groups at the crystalline ice surface. (Auth. mod.)

I-52659

Hines, K.M., Bromwich, D.H., Parish, T.R., **Mesoscale modeling study of the atmospheric circulation of high southern latitudes,** *Monthly weather review,* Apr. 1995, 123(4), p.1146-1165, 35 refs.

The meteorology of high southern latitudes during winter is simulated using a cloud-free version of The Pennsylvania State University-National Center for Atmospheric Research Mesoscale Model version 4 (MM4) with a 100 km horizontal resolution. Comparisons between idealized simulations of Antarctica with MM4 and with the mesoscale model of Parish and Waight reveal that both models produce similarly realistic velocity fields in the boundary layer. The latter model tends to produce slightly faster drainage winds over East Antarctica. The intensity of the katabatic winds produced by MM4 is sensitive to parameterizations of boundary layer fluxes. A simulation of the period from 0000 UTC 2 June to 0000 UTC 8 June produces realistic synoptic phenomena including ridge development over East Antarctica, frontogenesis over the Amundsen Sea, and a katabatic surge over the Ross Ice Shelf. The lack of latent heating in the simulations apparently causes in some bias in the results. In particular, the cloud-free version of MM4 underpredicts the intensity of lows in the sea level pressure field. (Auth. mod.)

I-52682

Manabe, S., Stouffer, R.J., Spelman, M.J., **Response of a coupled ocean-atmosphere model to increasing atmospheric carbon dioxide,** *Ambio,* Feb. 1, 1994, 23(1), p.44-49, 29 refs.

This study investigates the response of a climate model to a 1% per year increase of atmospheric carbon dioxide. The model is a general circulation model of the coupled ocean-atmosphere-land surface system, with a global computational domain, smoothed geography, and seasonal variation of insolation. The simulated increase of sea-surface temperature is very slow in the northern North Atlantic and the Circumpolar Ocean of the Southern Hemisphere, where the vertical mixing of water penetrates deeply and the rate of deep water formation is relatively fast. Transient responses of the coupled model to the doubling and quadrupling of atmospheric CO_2 over a period of several centuries were investigated. During the entire 500-yr period of the experiment, the global mean surface air temperature increases almost 3.5°C when CO_2 is doubled, and 7°C when it is quadrupled. (Auth. mod.)

I-52685

Harries, J.E., Russell, J.M., III, Park, J., Tuck, A.F., Drayson, S.R., **Observations of absorbing layers in the antarctic stratosphere in October 1991,** *Royal Meteorological Society. Quarterly journal A,* Apr. 1995, 121(523), p.655-667, 15 refs.

Measurements of the transmission of solar infrared radiation through the earth's atmosphere by the HALOE experiment on the UARS spacecraft were made at high southern latitudes during Oct. 1991. These observations are direct measurements of atmospheric transmission, and do not need to be passed through a composition or temperature retrieval process; they are, therefore, amenable to direct interpretation. During Oct. 1991 the profiles of transmittance versus height in the atmosphere showed clear evidence for the arrival (from more northerly latitudes) of layers of some material which absorbs infrared radiation, at heights of up to 28 km. The spatial structure of the absorbing material shows considerable variability with longitude at a given latitude. The spectral properties of the detected absorption, measured at the various HALOE wavelengths, are consistent with absorption by sulphate aerosol, and clearly implicate the volcanic eruptions from Mts. Pinatubo and Hudson during 1991. (Auth. mod.)

I-52686

Heinemann, G., Noël, S., Chédin, A., Scott, N., Claud, C., **Sensitivity studies of TOVS retrievals with 3I and ITPP retrieval algorithms: application to the resolution of meso-scale phenomena in the Antarctic,** *Meteorology and atmospheric physics,* 1995, 55(1/2), p.87-100, 35 refs.

Retrievals from TIROS-N Operational Vertical Sounder (TOVS) data with the International TOVS Processing Package (ITPP version 3.3) and the Improved Initialization Inversion (3I version 2) algorithms are investigated. The comparative study comprises the retrieval mechanism from the first guess to the final result for collocated radiosonde/satellite data as well as the problem of horizontal resolution for simulated antarctic cold air pools. Simulations of cold air pools for cloud-free conditions show that cold air pools with a strong temperature anomaly and with diameters of 800 km and greater are well reproduced by ITPP and 3I. For smaller cold air pools with a moderate temperature perturbation, the resolution limits are reached if the diameter is smaller than 400 and 200 km for ITPP and 3I, respectively. The better performance of the 3I retrievals for smaller cold air pools is a consequence of the better first guess of the TIGR dataset compared with the regression first guess of the ITPP. (Auth. mod.)

I-52687

Barkov, N.I., Petrov, V.N., **Study of the paleoclimate in polar regions using deep ice cores from ice sheets** [Izuchenie paleoklimata poliarnykh oblasteĭ po glubokim ledianym kernam iz lednikovykh pokrovov], *Problemy Arktiki i Antarktiki; sbornik stateĭ,* 1994, Vol.67-68, p.10-24, In Russian. 29 refs.

Paleoclimatic events for the last 160,000 years are characterized. The age scale of ice cores taken at Vostok Station and the isotope content of the ice are determined. A correlation of the data obtained from the ice cores and deep-sea marine sediments is conducted. The amount of atmospheric precipitation, variations in air temperature, atmospheric dust control, and percentage of carbon dioxide in the atmosphere are assessed. Finally, the effect of planetary parameters and related insolation fluctuations on climatic fluctuations is shown. (Auth. mod.)

I-52688

Liubarskiĭ, A.N., **Mathematical modelling of the effect of external and internal factors on mean latitudinal temperature of Antarctica** [Matematicheskoe modelirovanie vozdeĭstviia vneshnikh i vnutrennikh faktorov na sredneshirotnuiu temperaturu Antarktiki], *Problemy Arktiki i Antarktiki; sbornik stateĭ,* 1994, Vol.67-68, p.64-74, In Russian. 12 refs.

An incorrect inverse problem of modelling variations in the anomalies in mid-latitude temperatures is examined. With the help of a correct model, each of the factors in the variations of the antarctic climatic system is analyzed. It is shown that volcanic activity has the strongest influence. (Auth. mod.)

I-52689

Voskresenskiĭ, A.I., Dianov-Klokov, V.I., Malkov, I.P., Radionov, V.F., IUrganov, L.N., **Spectroscopic measurements of carbon monoxide in the atmosphere of Antarctica (1977-1985)** [Spektroskopicheskie izmereniia okisi ugleroda v atmosfere Antarktidy (1977-1985 gg.)], *Problemy Arktiki i Antarktiki; sbornik stateĭ,* 1994, Vol.67-68, p.84-89, In Russian. 14 refs.

Variations in the percentage of carbon monoxide in the atmosphere for Mirnyy and Molodezhnaya stations, 1977-1985 are presented. The seasonal course and long-term trend of the concentration of carbon monoxide in the atmosphere is analyzed. (Auth. mod.)

I-52699

Bevilacqua, R.M., et al, **First results from POAM II: the dissipation of the 1993 antarctic ozone hole,** *Geophysical research letters,* Apr. 15, 1995, 22(8), p.909-912, 8 refs.

POAM II is a space-borne instrument which uses the solar occultation technique to measure the vertical distribution of ozone, aerosols and polar stratospheric clouds, and other properties of the stratosphere and mesosphere. POAM II was launched aboard the SPOT 3 satellite in time to observe the dissipation of the 1993 antarctic ozone hole. POAM data indicate that the antarctic ozone hole dissipates from the top downward. It also supports the hypothesis that the antarctic vortex is an effective containment vessel. However, the strength of the containment appears to decrease markedly at altitudes below 18 km. (Auth.)

I-52727

Helbling, E.W., Holm-Hansen, O., Morán, P., **AMLR program: Ultraviolet and visible solar irradiance around Elephant Island, Antarctica, January to March 1993,** *Antarctic journal of the United States,* 1993, 28(5), p.189-191, 3 refs.

As one component of the AMLR program, the phytoplankton group has been measuring total and spectral UVR, as well as photosynthetically available radiation (PAR, 400 to 700 nm) reaching the surface of the ocean and its attenuation in the water column throughout the AMLR study area in the vicinity of Elephant I. The measurements described in this article were conducted on board the NOAA ship *Surveyor.* The incident solar radiation during both legs of the cruise is shown in a figure. The attenuation of solar irradiance in the water column at two representative stations, one with high and the other with low chlorophyll-*a* concentrations, is also shown. Data show the relationship between the diffuse attenuation coefficients (K_{PAR}) in the upper mixed layer, obtained with the cosine collector on the rosette, and chlorophyll-*a* concentrations in the upper mixed layer.

I-52754

Gernandt, H., Dethloff, K., Kanzawa, H., **Qualitative assessment of height dependent interannual variability of polar stratospheric ozone. Part I: Long-term variability and stratospheric ozone depletion,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Nov. 1994, p.1-13, 12 refs.

Regular observations have been made for the months of Sep. and Oct. since the beginning of ozone soundings at Showa Station in 1966. An attempt is presented to assess long-term ozone variations by using monthly mean ozone data obtained at Showa and additional data from Georg Forster and Neumayer Stations. These ozone data, together with monthly means of potential temperature and their standard deviations as observed at Showa, as well as the monthly means of the QBO phase as observed at 10 hPa altitude in tropical latitudes, are used to discuss the long-term control of polar stratospheric ozone by atmospheric dynamics. It is suggested that inside the polar vortex, chemically caused ozone reductions at 70 hPa are also controlled by dynamic processes. Significant impacts of volcanic aerosols on stratospheric ozone dominate at 150 hPa pressure level, showing additional severe ozone depletion. (Auth. mod.)

I-52755

Aoki, S., Nakazawa, T., Murayama, S., Shimizu, A., Hayashi, M., Iwai, K., **Relationship between atmospheric CO_2 and CH_4 concentrations at Syowa Station, Antarctica,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Nov. 1994, p.14-18, 7 refs.

Precise measurements of atmospheric CO_2 and CH_4 concentrations have been recorded at Showa Station since 1984 and 1987, respectively. Measured concentrations show secular increase, together with seasonal cycle and irregular variations. Negative correlation is clearly seen between the secular trends of the CO_2 and CH_4 concentrations. The increased rates of CO_2 and CH_4 show oscillations with periods of 2.3 to 2.8 years. The phases of the average seasonal cycles of CO_2 and CH_4 coincide, but interannual variations of the observed seasonal cycle of CO_2 are greater than those of CH_4. (Auth.)

I-52756

Kaneto, S., Kishi, T., **Aerosol optical depth observations by JARE-33 and JARE-34 in 1991 and 1992,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Nov. 1994, p.19-26, 9 refs.

To reveal the latitudinal distribution of atmospheric turbidity enhanced by the eruption of Mt. Pinatubo in June 1991 and Mt. Hudson in Aug. 1991, aerosol optical depth at 5 wavelengths was observed with a portable sunphotometer (EKO MS-120) in Nov. to Dec. of 1991 and 1992. The observations were made from Tokyo to Showa station on the icebreaker *Shirase,* and over the path from Showa to Dome F, about 1000 km inland. Another sunphotometer observation has been continued at Showa since 1985. From Showa observations, a notable increase of aerosol optical depth was seen in late 1991, and a gradual decrease followed it. The aerosol optical depth on the path from Showa to Dome F in Oct. to Dec. 1992 was almost the same as that at Showa over a distance of 1000 km. In early Dec. 1992, a temporary increase of aerosol optical depth was seen. (Auth. mod.)

I-52757

Kitoh, A., **Tropical influence on the South Pacific double jet variability,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Nov. 1994, p.34-45, 16 refs.

An observational and modeling study of the interannual variability of the South Pacific atmospheric circulation is presented. The observed data cover the period 1979-1991. An atmospheric general circulation model (GCM) has been integrated with the observed sea surface temperature (SST) for the period 1970-1989. It is shown that the subtropical jet is positively correlated with the SST anomalies in the central equatorial Pacific. Thus, the jet is directly influenced by tropical heating. On the other hand, the high latitude jet variability is associated with a wave train through eastern Australia, south-east of New Zealand, West Antarctica and southern South America. It is found from the stationary wave flux analysis that when the SST anomalies in the Indian Ocean are positive, this wave train is formed in a location to weaken the Pacific high latitude jet both in the observed data and in the GCM. (Auth.)

I-52758

Kaneto, S., Igarashi, H., Matsuhara, K., **Wind variation features of Syowa and Asuka stations, East Antarctica,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Nov. 1994, p.46-52, 5 refs.

Wind speed and direction at Showa and Asuka stations have been analyzed. From monthly mean wind speed, Asuka was classified in the inland area type of J. Inoue. To reveal diurnal variations of the two stations' winds, hourly wind data of the day were selected to avoid the influence of large-scale disturbances. Wind speed shows large diurnal variation at both stations on clear summer days but not on clear winter days. Prevailing wind direction at Showa is NE and at Asuka is ESE. At Showa, diurnal variation of wind direction is seen on clear summer days; a secondary direction appears on clear winter days. At Asuka on clear summer days, the variation of wind direction is small and the same as that of inland observations. (Auth.)

I-52759

Nakagawa, K., Shimodoori, H., **Relationship between the thermal belt on the slope of the ice sheet on the Sôya Coast and the surface inversion layer over Syowa Station,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Nov. 1994, p.53-65, 5 refs.

All the NOAA/AVHRR thermal infrared images received at Showa Station from Feb. 1990 to Jan. 1991 were analyzed to make temperature distribution maps. From this analysis the warmer area in midslope, i.e. the so-called thermal belt, appeared on the ice sheet slope along the coast around Lützow-Holm Bay, especially on the Sôya Coast, frequently in winter. The relationship between the thermal belt on the Sôya Coast and the surface inversion layer over Showa was investigated. When the surface inversion layer thickness increased, the thermal belt was displaced toward the interior or higher part of the ice sheet slope. However, even if the surface inversion layer appeared over Showa, the thermal belt did not necessarily appear. The appearance or absence of the thermal belt on the ice sheet slope is considered to correspond to how the surface inversion layer over the ice sheet, a katabatic wind, connects with the surface inversion layer over the foot of the slope. (Auth.)

I-52760

Nakagawa, K., **Micrometeorological observation over the fast ice at Ongul Strait near Syowa Station,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Nov. 1994, p.66-80, 7 refs.

Micrometeorological conditions were observed over fast ice with overlying thick snow cover, and underlying deep sea, approximately in the center of Ongul Sound from the end of Mar. to the beginning of Dec., 1990. In response to the annual change of solar radiation, the radiation balance showed an annual change: the balance was negative for a period including the polar night, and changed to positive after Oct. Corresponding to the radiation balance, both the sensible heat flux from air to snow and the conductive heat flux from fast ice to snow changed. As the prevailing wind velocity increased, the temperature and humidity increased, and the radiative heat loss, sensible heat flux from the air to the snow, and conductive heat flow from the fast ice to snow decreased. (Auth.)

I-52769

Lykossov, V.N., Wamser, C., **Turbulence intermittency in the atmospheric surface layer over snow-covered sites,** *Boundary-layer meteorology,* Feb. 1995, 72(4), p.393-409, 26 refs.

Wind component fluctuations over antarctic pack ice have been decomposed into contributions of large and small-scale eddies to study turbulence structures in the atmospheric surface layer over snow-covered pack ice, for a case with snow drift and another without. It was found that on average, the large eddies contribute little to the covariance, but significantly to the variance of the horizontal wind components. The time variations of the turbulent kinetic energy and the friction velocity, determined by the small eddies, are suppressed when there is drifting snow. It was found that events with strong drag reduction during snow drift correspond to a strong increase of contributions from the first and third quadrant. However, strong drag reduction events in the case without snow drift are caused by a general decrease of contributions from all four quadrants. It was also found that interactions are significantly less correlated with ejections and sweeps in the case with snow drift than in the case without. (Auth. mod.)

I-52770

Van den Broeke, M.R., Bintanja, R., **Summertime atmospheric circulation in the vicinity of a blue ice area in Queen Maud Land, Antarctica,** *Boundary-layer meteorology,* Feb. 1995, 72(4), p.411-438, 32 refs.

The surface wind field is an important factor controlling the surface mass balance of Antarctica. This paper focuses on the observed atmospheric circulation during summer of an antarctic blue ice area in Queen Maud Land. Blue ice areas are characterized by a negative surface mass balance and hence provide an interesting location to study the influence of meteorological processes on large local mass balance gradients. Observations performed at the coastal stations Halley and Georg von Neumayer show the pronounced effects of synoptic forcing. The surface winds in the valley of the blue ice area fall into two distinct flow patterns, occurring with about equal frequency during the experiment. Flow type I is associated with cyclonic activity at the coast, resulting in strong easterly winds, precipitation and drifting snow. Flow characteristics inside and outside of the valley are similar during these conditions. Flow type II occurs when a high pressure system develops in the Weddell Sea, weakening the free atmosphere geostrophic winds. A local circulation is able to develop inside the valley of the blue ice area during these tranquil conditions. The transition from flow type II to flow type I is associated with front-like phenomena inside the valley. (Auth. mod.)

I-52778

Toon, O.B., Tolbert, M.A., **Spectroscopic evidence against nitric acid trihydrate in polar stratospheric clouds,** *Nature,* May 18, 1995, 375(6528), p.218-221, 30 refs.

Heterogeneous reactions on polar stratospheric clouds (PSCs) play a key role in the photochemical mechanism thought to be responsible for ozone depletion in the Antarctic and the Arctic. Reactions on PSC particles activate chlorine to forms that are capable of photochemical ozone destruction, and sequester nitrogen oxides (NO_x) that would otherwise deactivate the chlorine. Although the heterogeneous chemistry is now well established, the composition of the clouds themselves is uncertain. It is commonly thought that they are composed of nitric acid trihydrate, although observations have left this question unresolved. Reanalyzed here are infrared spectra of type I PSCs obtained in Antarctica in Sep. 1987, using recently measured optical constants of the various compounds that might be present in PSCs. These PSCs were not composed of nitric acid trihydrate but instead had a more complex composition, perhaps that of a ternary solution. Because cloud formation is sensitive to composition, this finding will alter understanding of the locations and conditions in which PSCs form. In addition, the extent of ozone loss depends on the ability of the PSCs to remove NO_x permanently through sedimentation. The sedimentation rates depend on PSC particle size which in turn is controlled by the composition and formation mechanism. (Auth. mod.)

I-52793

Midya, S.K., Jana, P.K., Lahiri, T., **Theoretical model of atmospheric ozone depletion,** *Earth, moon, and planets,* 1995, 66(3), p.279-284, 4 refs.

A critical study on different ozone depletion and formation processes has been made and the following important results are obtained: from analysis it is shown that O_3 concentration will decrease very minutely with time for normal atmosphere when [O], [O_2] and UV-radiation remain constant; an empirical equation is established theoretically between the variation of ozone concentration and time; and special ozone depletion processes are responsible for the dramatic decrease of O_3 concentration over Antarctica. (Auth.)

I-52801

Roldugin, V.C., Henriksen, K., **Volcanic signatures in long-term ozone records,** *SPIE—The International Society for Optical Engineering. Proceedings,* June 1993, Vol.2047, Atmospheric ozone, Tromsø, Norway, 28-29 June 1993. Edited by T. Henriksen, p.27-35, 15 refs.

DLC QC879.7.A879 1993

Some major volcanic eruptions have a dramatic influence on the global ozone layer. The effect has to be included when trends are evaluated for limited periods, 10-20 years. In this study the influence of the eruptions of El Chichon is studied, and depleting effects of the eruptions of Mt. Agung and Mt. Pinatubo are identified. Reference to the antarctic ozone hole in this paper is found in the introduction, where some literature linking ozone depletion to the anthropogenic releases of CFC gases is briefly discussed.

I-52802

Kasatkina, E.A., Shumilov, O.I., Raspopov, O.M., Henriksen, K., Fisher, S., Slusser, J., **Comparison of stratospheric ozone variations in Arctic and Antarctic during solar proton events,** *SPIE—The International Society for Optical Engineering. Proceedings,* June 1993, Vol.2047, Atmospheric ozone, Tromsø, Norway, 28-29 June 1993. Edited by T. Henriksen, p.70-82, 24 refs.

DLC QC879.7.A879 1993

The influence of solar protons of the ground level event (GLE) type on stratospheric ozone was investigated. The asymmetry of ozone's so-called mini-holes, caused by GLEs between the arctic and antarctic polar caps (N/S asymmetry), is discussed in terms of their spatial variations and possible mechanisms. Based on balloon measurements and ground-based ozone data obtained from arctic and antarctic observatories, the GLEs occurring on the following dates were considered: Sep. 29, 1989; Oct. 19, 1989; Oct. 24, 1989; and May 21-28, 1990. In the light of the study's results, the hypothesis is proposed that solar protons trigger aerosol acceleration and the creation of polar stratospheric clouds. (Auth. mod.)

I-52803

Jaross, G., Krueger, A., **Ice radiance method for BUV instrument monitoring,** *SPIE—The International Society for Optical Engineering. Proceedings,* June 1993, Vol.2047, Atmospheric ozone, Tromsø, Norway, 28-29 June 1993. Edited by T. Henriksen, p.94-101, 5 refs.

DLC QC879.7.A879 1993

The radiance of large ice-covered land masses has been used to monitor TOMS instrument sensitivities. Greenland and Antarctica provide uniform and stable ice surfaces whose average albedo appears to be constant within the desired accuracy for instrument monitoring. Instrument radiance response will depend upon view and illumination angles, the sun-earth distance, and atmospheric conditions. Restriction to nadir views eliminates view angle dependence, and corrections are made for sun-earth distance. The effect of atmospheric conditions, such as ozone and clouds, is minimized by monitoring at wavelengths above 340 nm and by the high surface radiance. Relative instrument response is determined by the ratio of signals measured at different times using a binning technique to account for differences in solar illumination angles. (Auth. mod.)

I-52804

Neuendorffer, A., **Decline in polar stratospheric ozone as observed by NOAA infrared sounders,** *SPIE—The International Society for Optical Engineering. Proceedings,* June 1993, Vol.2047, Atmospheric ozone, Tromsø, Norway, 28-29 June 1993. Edited by T. Henriksen, p.110-121.

DLC QC879.7.A879 1993

The impact of chlorofluorocarbon (CFC) release on the earth's ozone shield is becoming more evident with every passing year. It is imperative that the long-term continuous monitoring of this environmental global experiment proceed by every means possible. The National Oceanic and Atmospheric Administration (NOAA) has 14 years of TIROS Operational Vertical Sounder (TOVS) earth radiation data that include ozone-sensitive 9.7 micron information. The 9.7 micron IR channel was selected specifically to permit NOAA's operational polar orbiting weather satellites to monitor total column ozone. Relatively accurate physically derived TOVS infrared global ozone maps are now available in real time. What these IR TOVS synoptic total column ozone maps lack in precision and resolution they make up for in longevity, night capability and full pole-to-pole coverage. The current 14 year sequence of daily TOVS ozone maps from Feb. 1979 to May 1993 covers a period of unprecedented decline in the earth's ozone shield. Recent antarctic ozone holes are developing earlier, growing larger and lasting longer than ever before. (Auth. mod.)

I-52805

Boime, R.D., Warren, S.G., **Mapping Antarctic ozone from visible-channel data,** *SPIE—The International Society for Optical Engineering. Proceedings,* June 1993, Vol.2047, Atmospheric ozone, Tromsø, Norway, 28-29 June 1993. Edited by T. Henriksen, p.122-131, 9 refs.

DLC QC879.7.A879 1993

Accurate, detailed maps of total ozone were not available until the launch of the Total Ozone Mapping Spectrometer (TOMS) in late 1978. However, the Scanning Radiometer (SR) on NOAA satellites during the 1970s included a visible channel that overlapped closely with the Chappuis absorption band of ozone around 600 nm. The antarctic atmosphere and surface contain no other significant absorbers of radiation at those wavelengths, which makes Antarctica an ideal region to isolate the ozone signal in the visible-channel data. The authors are investigating whether SR data can be used to map antarctic ozone prior to 1978. They use a simple calculation of two-way transmittance to obtain total ozone from data taken by the Advanced Very High Resolution Radiometer (AVHRR). They are modifying the retrieval method to include a comprehensive bidirectional reflectance function for the surface and for uniform clouds, and to choose the appropriate scales for spatial and temporal averaging. If the method appears useful after these improvements have been made, the technique could be applied to SR data from the 1970s. (Auth. mod.)

I-52829

Bruce, E.J., Handley, P.L., Wan, Z.M., Smith, R.C., **Estimation of ozone concentrations based on measurements of solar ultraviolet radiation in the Antarctic using the BSI PUV-510 instrument,** *SPIE—The International Society for Optical Engineering. Proceedings,* 1994, Vol.2258, Ocean Optics XII, Bergen, Norway, June 13-15, 1994. Edited by J.S. Jaffe, p.12-20, 24 refs.

DLC GC177.6.O27 No.12 1994

The greatly reduced stratospheric ozone concentrations over the antarctic continent, the consequent increase in short wavelength ultraviolet radiation (UVB) and the influence of this increased UVB on the antarctic ecosystem has led to the development of new instruments for the measurement of these effects. One objective of research in this area is to estimate column ozone concentrations based upon surface UV measurements. Current commercial instruments vary from full spectral narrow-band to single broad-band, so the usefulness of data from these instruments for linking surface UV measurements to column ozone concentrations also varies. One instrument, arguably a compromise between a more complex and expensive full spectral narrow-band instrument and a simpler broad-band instrument, is manufactured by Biospherical Instruments (BSI) for the measurements of surface and in-water UV radiation. The authors present preliminary results of direct observations of springtime UVB, using the BSI PUV-510, under the antarctic ozone hole and provide an algorithm for the accurate estimation of column ozone based upon these measurements. It is shown that data from the PUV-510 can be used to estimate column ozone, given a rough estimate of surface albedo, to within an accuracy of ±10 DU and that this algorithm is robust, working well for both clear and cloudy skies.

I-52843

Carrasco, J.F., Bromwich, D.H., **Case study of a midtropospheric subsynoptic-scale cyclone that developed over the Ross Sea and Ross Ice Shelf of Antarctica,** *Antarctic science,* June 1995, 7(2), p.199-210, 28 refs.

Satellite imagery, synoptic-scale analyses and automatic weather station data were used to study a subsynoptic-scale cyclone that developed over the Ross Sea and Ross Ice Shelf areas. A pre-existing subsynoptic-scale midtropospheric cyclone descended from southern Victoria Land into the semi-permanent baroclinic environment over the southwestern corner of the Ross Sea. This cyclone then developed into a frontal system travelling southeastward over the Ross Ice Shelf and decayed five days later over Marie Byrd Land. It is concluded that stretching of the subsynoptic-scale low, while descending over 2000 m from the high plateau down to sea level, increased its cyclonic vorticity via conservation of potential vorticity. This, along with a cold katabatic outbreak into the northern part of the circulation, provided the mechanisms for its initial development. Subsequently, cold boundary-layer air over the Ross Ice Shelf spiralled into the subsynoptic-scale cyclone supporting its further development. (Auth.)

I-52847

Vaida, V., Simon, J.D., **Photoreactivity of chlorine dioxide,** *Science,* June 9, 1995, 268(5216), p.1443-1448, 53 refs.

Laboratory experiments and quantum calculations have been used to develop a comprehensive understanding of the photoreactivity of chlorine dioxide (OClO). The photoreactivity is strongly dependent on the medium (gas phase, liquid solution, or cryogenic matrix). These data reveal details of the complex chemistry of OClO. The potential role of this radical in stratospheric ozone depletion is discussed in accord with the laboratory measurements. Several applications of these processes to Antarctica are noted including a prediction that, if the quantum yield for Cl over the entire absorption spectra were 10%, the total antarctic ozone loss would be 3%. (Auth. mod.)

I-52848

Anthony, S.E., Tisdale, R.T., Disselkamp, R.S., Tolbert, M.A., Wilson, J.C., **FTIR studies of low temperature sulfuric acid aerosols,** *Geophysical research letters,* May 1, 1995, 22(9), p.1105-1108, 18 refs.

Fourier transform infrared (FTIR) spectroscopy was used to study low-temperature sulfuric acid aerosols representative of global stratospheric sulfate aerosols (SSAs). Sub-micron sized H_2SO_4 particles were generated using a constant output atomizer source. The particles were then exposed to water vapor before being injected into a low temperature cell. Multipass transmission FTIR spectroscopy was used to determine the phase and composition of the aerosols vs. time for periods of up to 5 hours. Binary H_2SO_4/H_2O aerosols with compositions from 35 to 95 wt% H_2SO_4 remained liquid for over 3 hours at temperatures ranging from 189-240 K. These results suggest that it is very difficult to freeze SSAs via homogeneous nucleation. Attempts to form aerosols more dilute than 35 wt% H_2SO_4 resulted in ice formation. (Auth.)

I-52865

Antarctic ozone hole, UV radiation and phytoplankton [Antarktisches Ozonloch, UV-Strahlung und Phytoplankton], *Naturwissenschaftliche Rundschau,* Feb. 1995, 48(2), p.69-70, In German. 4 refs.

This note correlates marine phytoplankton productivity with variations in intensity of ultraviolet radiation transmitted through the antarctic atmosphere.

I-52885

Bodhaine, B.A., **Aerosol absorption measurements at Barrow, Mauna Loa and the South Pole,** *Journal of geophysical research,* May 20, 1995, 100(D5), p.8967-8975, 58 refs.

Aerosol absorption has been measured continuously using aethalometers at Barrow, AK (1986 to present); Mauna Loa, HI (1990 to present); and South Pole, Antarctica (1987-1990). These three stations are part of a network of baseline monitoring stations operated by the Climate Monitoring and Diagnostics Laboratory (CMDL) of the National Oceanic and Atmospheric Administration (NOAA). Condensation nucleus (CN) concentration and multiwavelength aerosol scattering have also been measured continuously for many years at these stations. Aethalometer measurements are usually reported in terms of atmospheric black carbon aerosol (BC) concentration using the calibration suggested by the manufacturer. The *in situ* aerosol absorption (550 nm) from aethalometer measurements is deduced by assuming that the aerosol absorption on the aethalometer filter is enhanced by a factor of 1.9 over that in the atmosphere. Each station shows a considerable annual cycle in aerosol absorption, aerosol scattering and single-scattering albedo. The maximum in the Barrow annual cycle is caused primarily by the springtime arctic haze phenomenon; the maximum in the Mauna Loa annual cycle is caused by the springtime Asian dust transport; and the maximum in the South Pole annual cycle is caused by late winter transport from southern mid-latitudes. (Auth. mod.)

I-52958

Wilson, J.C., **Counting condensation nuclei in the antarctic ozone mission,** *U.S. National Aeronautics and Space Administration. Technical report,* Nov. 1994, NASA-CR-197113, 62p., N95-15847, Refs. passim.

This report primarily concerns the measurement of aerosol in the stratosphere from NASA ER-2 aircraft in studies of stratospheric ozone depletion in the northern and southern hemispheres. The ER-2 Condensation Nucleus Counter (CNC) measures the number concentration of particles in the diameter range of approximately 0.01 to 1 micron. The Passive Cavity Aerosol Spectrometer measures size distributions in the 0.17 to 3 micron diameter range. This instrument was upgraded during the study to a Focused Cavity Aerosol Spectrometer (FCAS). This upgrade permitted the instrument to measure particles as small as 0.05 micron in diameter. The inlet for the PCAS and FCAS was modified and characterized so that the modifications to the aerosol due to anisokinetic sampling and heating upon sampling and in transport to the measurement location were accounted for in the data analysis. (Auth. mod.)

I-52963

Fontana Martínez, H., Bidegain Dorelo, M., **Climate at Artigas Station** [Aproximación al conocimiento del clima en la base científica "Artigas" (Isla Rey Jorge - Shetland del Sur)], *Montevideo. Instituto Antártico Uruguayo. Actividad scientífica 1986/87 (Scientific activity 1986-1987),* Jan. 1989, Vol.2, p.7-13, In Spanish with English summary. 4 refs.

DLC G845.A28

Meteorological observations carried out at Artigas Station from Mar. 1, 1986 to Feb. 28, 1987 are reported. Different parameters are analyzed, commented upon, and presented in tables. Annual and average values are determined.

I-52970

Keeling, C.D., Whorf, T.P., Wahlen, M., Van der Plicht, J., **Interannual extremes in the rate of rise of atmospheric carbon dioxide since 1980,** *Nature,* June 22, 1995, 375(6533), p.666-670, 26 refs.

Observations of atmospheric CO_2 concentrations at Mauna Loa, Hawaii and at the South Pole over the past four decades show an approximate proportionality between the rising atmospheric concentrations and industrial CO_2 emissions. This proportionality was disturbed in the 1980s by a disproportionately high rate of rise of atmospheric CO_2, followed after 1988 by a pronounced slowing down of the growth rate. To probe the causes of these changes, the authors examine here the changes expected from the variations in the rates of industrial CO_2 emissions over this time, and also from influences of climate such as El Niño events. The $^{13}C/^{12}C$ ratio of atmospheric CO_2 is used to distinguish the effects of interannual variations in biospheric and oceanic sources and sinks of carbon. It is proposed that the recent disproportionate rise and fall in CO_2 growth rate were caused mainly by interannual variations in global air temperature and possibly also by precipitation. (Auth. mod.)

I-52974

Garcia, O., Pagan, K.L., Foschi, P.G., Gaines, S.E., Hipskind, R.S., **Detection of polar stratospheric clouds over Antarctica using AVHRR images obtained at Palmer Station during August 1992,** *Polar record,* Apr. 1995, 31(177), p.211-226, 30 refs. Presented at the 3rd Circumpolar Symposium on Remote Sensing of Arctic Environments, Fairbanks, AK, May 16-20, 1994.

Four case studies are presented that focus on a joint analysis of AVHRR images with other independently obtained data sets to identify examples of both optically thick and thin polar stratospheric clouds (PSCs) over Antarctica. Optically thick PSCs are shown to be readily identifiable by the temperature signatures in AVHRR channel 5 images over the Antarctic Peninsula-Weddell Sea area. A time series of optically thick PSCs as seen in satellite images obtained at Palmer Station is produced and discussed. Four events are identified and discussed where the areal coverage by cold temperatures indicative of PSCs expands to cover a significant portion of the area sampled. Plans for further research are outlined. (Auth.)

I-52987

Maiss, M., Levin, I., **Global increase of SF_6 observed in the atmosphere,** *Geophysical research letters,* Apr. 1, 1994, 21(7), p.569-572, 25 refs.

High precision long-term observations of the trace gas sulphur hexafluoride (SF_6) in background air at Neumayer Station (1986-1991), and at Izaña observatory, Tenerife (1991-1992), are presented. Since the very first measurements in 1970 (0.03 pptv), the purely anthropogenic greenhouse gas SF_6 has increased by two orders of magnitude to a global mean value of 2.8 pptv in 1992. The observations can best be fitted by a quadratic curve with a recent increase rate of 8.3%/yr. A significant north-south gradient of 0.29 pptv is observed. From this gradient an interhemispheric exchange time of 1.4 years is derived. A modeled atmospheric budget history agrees reasonably well with estimates of global SF_6 production rates and leads to an extrapolated SF_6 concentration of about 20 pptv by the year 2030. (Auth.)

I-52998

Collins, R.L., **Middle atmosphere structure and dynamics: Lidar studies at the South Pole, Syowa and Urbana (gravity waves, stratosphere),** Urbana, University of Illinois, 1994, 146p., University Microfilms order No. 94-16352, Ph.D. thesis. Refs. p.137-144.

Amundsen-Scott Station stratospheric observations yielded a high resolution data set of stratospheric temperature and polar stratospheric cloud (PSC) backscatter ratio profiles during the austral winter and spring of 1990. The observations show that the seasonal development of the clouds is primarily determined by the behavior of the temperature field. The PSCs are composed predominantly of nitric acid trihydrate particles. Correlation with frost-point measurements shows that nitric acid mixing ratios are depressed in the spring. The small-scale structure of the clouds appears to be controlled by gravity waves propagating upward through the clouds. Lidar measurements of the mesospheric Na layer at Amundsen-Scott (1990) and Showa (1985) stations are used to characterize mesopause region gravity wave activity over Antarctica. The structure of the Na layer reflects the general circulation of the high-latitude mesopause. The monochromatic waves observed over Antarctica show the same general characteristics as those reported from other sites. (Auth. mod.)

I-53016

Gille, J., et al, **Early results of validation and application of CLAES data,** *Advances in space research,* Sep. 1994, 14(9), p.(9)5-(9)11, 5 refs.

CLAES results on temperature and the long-lived trace species CH_4, N_2O, and CF_2Cl_2 are applied to the study of the formation of the antarctic vortex and the expected downward motions in the vortex during the transition from austral summer to winter. The observed variations, showing downward motion of mixing ratio contours, are consistent with expectations. An unexpected result is the indication of larger downward motions in winter near 70°S than over the pole. (Auth.)

I-53041

Jouzel, J., et al, **Two-step shape and timing of the last deglaciation in Antarctica,** *Climate dynamics,* Apr. 1995, 11(3), p.151-161, Refs. p.159-161.

The authors present a detailed isotopic record analyzed in a new ice core drilled at Dome B in East Antarctica that fully demonstrates the existence of an antarctic cold reversal (ACR). These results suggest that the two-step shape of the last deglaciation has a worldwide character but they also point to noticeable interhemispheric differences. Thus, the coldest part of the ACR, which shows a temperature drop about three times weaker than that recorded during the Younger Dryas (YD) in Greenland, may have preceded the YD. Antarctica did not experience abrupt changes and the two warming periods started there before they started in Greenland. The links between Southern and Northern Hemisphere climates throughout this period are discussed in the light of additional information derived from the antarctic dust record. (Auth. mod.)

I-53044

Bintanja, R., Van den Broeke, M.R., **Momentum and scalar transfer coefficients over aerodynamically smooth antarctic surfaces,** *Boundary-layer meteorology,* Apr. 1995, 74(1-2), p.89-111, 29 refs.

Vertical profiles of wind speed, temperature and humidity were used to estimate the roughness lengths for momentum (z_0), heat (z_H) and moisture (z_Q) over smooth ice and snow surfaces. The profile measurements were performed in the vicinity of a blue ice field in Queen Maud Land. The values of z_0 over ice ($3 \cdot 10^{-6}$ m) seem to be the smallest ever obtained over permanent natural surfaces. The settling of snow on the ice and the loss of momentum at saltating snow particles serve as momentum-dissipating processes during snow-drift events. The scalar roughness lengths and surface temperature can be evaluated from the temperature and humidity profile measurements if the ratio z_H/z_Q is specified. This new method circumvents the difficult measurement of surface temperature. The scalar roughness lengths seem to be approximately equal to z_0 for a large range of low roughness Reynolds numbers, despite the frequent occurrence of drifting snow. Possible reasons for this agreement with theory of non-saltating flow are discussed. (Auth.)

I-53045

Naithani, J., Dutta, H.N., Pasricha, P.K., Reddy, B.M., Aggarwal, K.M., **Evaluation of turbulent fluxes over Maitri, Antarctica,** *Boundary-layer meteorology,* Apr. 1995, 74(1-2), p.195-208, 20 refs.

Turbulent fluxes have been evaluated for clear sunny days over Maitri Station using the basic meteorological data recorded at four levels of a 28 m tower. The data are supplemented with radiation data. The surface layer over Maitri remains thermally stratified during the hours of minimum solar insolation, the so-called nighttime period. The surface winds during this period are generally very strong, resulting in high momentum fluxes. In particular, for high winds (>12 m/s), the temperature gradient is found to be less positive than for moderate winds (4 to 7 m/s). Solar insolation provides the daytime heating necessary for the diurnal variation of atmospheric stability and hence for the turbulent fluxes. Thus on clear days, daytime conditions are marked by upward transport of heat with reduced momentum flux, while stable nighttime conditions are marked by a downward heat flux with increased momentum fluxes. (Auth.)

I-53047

King, J.C., Turner, J., Chen, R., Boyer, D.L., Tao, L., **Comments on "Laboratory simulation of atmospheric motions in the vicinity of Antarctica"**, *Journal of the atmospheric sciences,* Apr. 15, 1995, 52(8), p.1260-1261, Includes reply. 8 refs. For paper under discussion see 48-2146 or 22I-49651.

This note includes comment and reply on the accuracy of the original authors' interpretation of antarctic atmospheric circulation derived from correlation of simulated results with photointerpretation of spaceborne cloud imagery.

I-53048

Biggs, P., Canosa-Mas, C.E., Fracheboud, J.M., Shallcross, D.E., Wayne, R.P., **Efficiency of formation of CH_3O in the reaction of CH_3O_2 with ClO,** *Geophysical research letters,* May 15, 1995, 22(10), p.1221-1224, 17 refs.

In an experiment to simulate heterogeneous chemical reactions in the antarctic stratosphere, a discharge-flow apparatus was used to determine the branching ratio α for the channel of the reaction of ClO with CH_3O_2 that leads to the formation of CH_3O. The experiments were performed at 2 Torr pressure and at room temperature. ClO was the excess reactant and was measured by mass spectrometer; CH_3O was detected by laser-induced fluorescence. The value of α was shown to depend on the fraction β of the reaction of CH_3O with Cl atoms that leads to the formation of CH_3O. Comparison with other published results suggests the possibility of three significant product channels for the reaction of CH_3O_2 with ClO. (Auth. mod.)

I-53059

Van Allen, R., Murcray, F., **Infrared atmospheric absorption and emission studies,** *Antarctic journal of the United States,* 1993, 28(5), p.259-260, 3 refs.

The authors are measuring the infrared absorption spectrum of the atmosphere using the sun as a source from McMurdo Station. They are also measuring the infrared emission spectrum of the atmosphere from Amundsen-Scott Station. The main purpose of this experiment is to collect atmospheric emission data during the austral winter to measure column abundances of water vapor, ozone, fluorocarbon-11, fluorocarbon-12 and nitric acid as well as absolute total radiance in the region of 7-20 microns (500-1,500 wavenumbers). The spectra for 1992 have been calibrated and show a clear improvement in signal-to-noise ratio compared with the first year of the experiment. Even in July, the signal was clear enough to observe the seasonal disappearance of HNO_3.

I-53060

Johnson, B.J., Deshler, T., **Balloonborne measurements of ozone and aerosol profiles at McMurdo Station, Antarctica, during the austral spring of 1992,** *Antarctic journal of the United States,* 1993, 28(5), p.260-262, 4 refs.

Balloonborne instruments were launched from McMurdo Station to measure vertical profiles of ozone and aerosol. Thirty-four profiles of ozone, 3 condensation nuclei profiles and 8 profiles of aerosol between 0.15 and 10.0 µm in radius, in 8 size classes, were measured from Aug. 23 through Oct. 31, 1992. Polar stratospheric clouds (PSCs) were observed from the initial sounding in late Aug. until the middle of Sep. The 1992 measurements provide evidence that volcanic aerosol does play a major role in ozone depletion, presumably through the heterogeneous chlorine chemistry that occurs on the additional surface area from the volcanic aerosol or by acting as a nucleation site for additional growth of PSCs. The decay of the volcanic aerosol in the stratosphere will reduce the number of concentrations for the 1993 season but may continue to have an impact on ozone depletion.

I-53061

De Zafra, R.L., Emmons, L.K., Reeves, M., Shindell, D.T., Trimble, C., **Field observations of stratospheric trace gases in support of the upper atmospheric research satellite mission during the antarctic spring of 1992,** *Antarctic journal of the United States,* 1993, 28(5), p.262-263, 5 refs.

This research is intended to provide correlative data in support of instruments on the National Aeronautic and Space Administration's upper atmospheric research satellite (UARS), as well as to gather independent data pertaining to ozone loss during the antarctic spring season. Due to the early seasonal nature of ozone loss over Antarctica, this research must be carried out during the winter fly-in period at McMurdo Station. Following an initial period of setting up and debugging of equipment, the authors carried out observations almost continuously from Sep. 9 until Oct. 10.

I-53062

Trimble, C., De Zafra, R.L., **Observation of trace gases in the stratosphere over a 1-year cycle at the South Pole,** *Antarctic journal of the United States,* 1993, 28(5), p.264-265, 4 refs.

During Sep. 1993 the authors monitored the large increase in low-altitude ClO in the antarctic spring, signifying the chemical attack on ozone by chlorine that leads to formation of the ozone hole, and followed the dynamical breakup of the vortex in Nov. by continued monitoring of N_2O and O_3. They made an unsuccessful search for hydrogen peroxide (H_2O_2), resulting at least in a useful upper limit being placed for the first time on how much may be present in the polar night stratosphere. They also obtained a large volume of unique data on several species (O_3, N_2O, HNO_3, NO_2, ClO, and H_2O_2) and made some unanticipated observations that should prove to be of considerable significance in characterizing dynamical and chemical effects occurring in the heart of the antarctic winter vortex.

I-53063

Khalil, M.A.K., Rasmussen, R.A., **Carbon monoxide in the antarctic atmosphere: observations of decreasing concentrations,** *Antarctic journal of the United States,* 1993, 28(5), p.265-267, 7 refs.

Data from Antarctica that suggest recent decreases in the concentration of CO are reported. Data are available between 1980 and 1992 from three experiments. CO concentrations increased during the first half of the period (1980-86) and decreased in the second half (1986-92). Overall, the decrease in recent years has more than compensated for the increases in earlier years, so that CO concentrations now (1991-92) are lower by about 10±3 ppbv compared with concentrations a decade ago (1980-81).

I-53064

Montzka, S.A., Myers, R.C., Butler, J.H., Elkins, J.W., Cummings, S.O., **Atmospheric measurements of HCFC-22 at the South Pole,** *Antarctic journal of the United States,* 1993, 28(5), p.267-269, 13 refs.

The authors report HCFC-22 measurements made at Amundsen-Scott Station through the end of 1992 and discuss them in light of results obtained at the next nearest station, Cape Grim. The growth rate of atmospheric HCFC-22 during 1992 at Amundsen-Scott Station was identical to the rate observed at Cape Grim, at 5.3 ppt per year. This rate is also consistent with a previous estimate for the Southern Hemisphere during 1992. A mean atmospheric mixing ratio of 95 ppt was determined for HCFC-22 during 1992 at the Amundsen-Scott Station. Similar mixing ratios were observed at Cape Grim, suggesting that the mixing ratio of HCFC-22 is fairly constant in the Southern Hemisphere below 40°S. Comparisons between results from the two stations suggest that HCFC-22 is stable in both dry and wet flask samples for extended periods.

I-53065

Walden, V.P., Warren, S.G., **Atmospheric longwave radiation spectrum and near-surface atmospheric temperature profiles at South Pole Station,** *Antarctic journal of the United States,* 1993, 28(5), p.269-271, 3 refs.

From a data set spanning the year from Jan. 14, 1992 through Jan. 14, 1993, the authors attempt to determine the controls of the longwave radiation budget on the antarctic plateau and to offer spectral measurements for use in testing atmospheric radiation models and radiation codes in climate models. Temperature profiles from a radiosonde on a tethered kite and on a routine balloon launch from Aug. 28, 1992 at Amundsen-Scott Station are shown in a figure. Radiation model simulations using various spectral and vertical resolutions are compared to the downward spectral radiance measurements.

I-53066

Warren, S.G., Starbuck, M., Groeneveld, C., **Relative elevations of meteorological facilities at South Pole Station,** *Antarctic journal of the United States,* 1993, 28(5), p.271-273, 1 ref.

Detailed information about the temperature profile near the surface is needed to interpret the measured infrared radiation spectra and to evaluate the turbulent heat fluxes. At Amundsen-Scott Station this profile can be obtained from radiosonde launches, together with temperature measurements at the snow surface, at the standard reporting height of 2 m above the surface, and near the top of the 23 m meteorological tower. The height of the radiosonde-launching deck has changed since its installation in the summer of 1974-75 relative to the 2 m thermometers, which are raised every year as the surface snow accumulates and rises against the meteorological towers. A table is presented showing elevations of benchmarks and meteorological facilities at Amundsen-Scott Station in Oct. and Nov. 1992.

I-53067

Carroll, J.J., Neff, W.D., **Observational and modeling studies of episodic events in the antarctic atmospheric boundary layer,** *Antarctic journal of the United States,* 1993, 28(5), p.273-274, 12 refs.

The authors' current experimental emphasis is on the measurement of mean profiles, local near-ground turbulent fluxes, and surface energy budgets. The mesoscale environment for these measurements is defined by five automatic weather stations, one at the South Pole and four located along latitude 89°S at longitudes of approximately 0, 90°E, 90°W, and 180°. In addition, the daily (winter) high-resolution radiosonde ascents provide periodic sampling of the deep atmosphere as well as a means to verify the nearly continuous remotely sensed wind and temperature information. The instrumentation was installed in Jan. 1993 and is expected to run for 1 year.

I-53068

Andreas, E.L., Claffey, K.J., Makshtas, A.P., **Low-level atmospheric jets and inversions on Ice Station Weddell 1,** *Antarctic journal of the United States,* 1993, 28(5), p.274-276, 9 refs.

During deployment on Ice Station Weddell 1 (ISW-1) in 1992 the authors launched radiosondes, typically at 00 and 12 Greenwich mean time (GMT) to investigate the structure of the lower atmosphere. Near the end of the drift in late May and early June, they launched simultaneous radiosondes from ISW-1 and from the *Akademik Fedorov* at 00, 06, 12, and 18 GMT as the *Fedorov* approached from the northeast to help disassemble the station. Here the authors report some preliminary results from this radiosounding program.

I-53069

Liu, Z., Bromwich, D.H., **Observational study of boundary-layer dynamics over West Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.277-280, 11 refs.

The boundary layer features inside the Siple Coast Confluence Zone have been derived from analyses of 1992 field observations. The data acquisition period started on Nov. 11 and ended on Dec. 8. In contrast to the situation in wintertime, the katabatic winds and surface air temperatures show significant diurnal variations which, for the surface air temperature, are a strong function of wind speed. The thermal structure of the boundary layer can be modified by the presence of strong winds and warm air advection.

I-53070

Du, Y., Bromwich, D.H., **Summer surface winds in the Siple Coast confluence zone, West Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.280-282, 10 refs.

This paper summarizes the summer wind and temperature fields obtained from a three-dimensional primitive equation mesoscale numerical model, with emphasis on the influence of diurnal insolation on the windfield. The general near-surface wind pattern over Siple Coast is reasonably well reproduced by the mesoscale numerical model. The effect of the diurnal solar forcing on the surface wind is significant. The predicted near-surface wind profile for Upstream B is in good agreement with the observations from the 1992-93 field experiment. Both the observed fluctuations of the low-level jet (LLJ) height and the timing of its change are obtained in the numerical simulation.

I-53071

Smith, S.R., Carrasco, J.F., Liu, Z., **Case study of a Siple Coast mesocyclone,** *Antarctic journal of the United States,* 1993, 28(5), p.283-285, 8 refs.

The presence of a strong synoptic-scale low off the coast of Marie Byrd Land along with a midtropospheric ridge resulted in a sharp baroclinic zone between Upstream B Camp and Byrd Station in West Antarctica. A mesoscale cyclone formed along this baroclinic zone on or near 0000 UTC on Nov. 11, 1992 and underwent explosive development over the next 9 h. The mesocyclone reached its peak intensity around 0000 UTC on Nov. 12.

I-53072

Carrasco, J.F., Bromwich, D.H., **Katabatic-wind-forced mesoscale cyclone development over the Ross Ice Shelf near Byrd Glacier during summer,** *Antarctic journal of the United States,* 1993, 28(5), p.285-288, 13 refs.

A mesoscale cyclone formed near Byrd Glacier in association with katabatic drainage from that glacier. The second synoptic cyclone seemed to contribute to the southward extension of the semipermanent subsynoptic surface trough located around Franklin I., whereas the midtropospheric southerly and southwesterly winds could support the intensification of the katabatic winds. The temporary retrogression of the midtropospheric trough toward the Ross Sea/Ross Ice Shelf area could provide upper-level support for cyclogenesis but not for its subsequent development. This study provides another example of katabatic-wind-forced mesoscale cyclogenesis near Byrd Glacier and its association with a similar area farther north around Franklin I.

I-53073

Liu, Z., Bromwich, D.H., **Northwesterly wind event near Ross Island,** *Antarctic journal of the United States,* 1993, 28(5), p.288-291, 15 refs.

The prevailing wind field in the Ross I. area in summer breaks down frequently and is replaced by northwesterly winds due to decreasing strength of the katabatic winds and increasing mesoscale pressure gradients. The mesoscale systems steer the drainage flow away from its normal propagation direction. The geographic location of Ross I. at the edge of the vast flat Ross Ice Shelf also provides opportunities for intrusion of synoptic-scale systems. Both SODAR and RASS proved to be useful for explaining the observed boundary layer wind and temperature changes, but more deployments in the surrounding area are needed to understand the detailed causes of such changes and their relation to the adverse weather affecting the area.

I-53074

Stearns, C.R., Weidner, G.A., **Snow temperature, wind speed, and wind direction around the Pegasus Runway during 1992,** *Antarctic journal of the United States,* 1993, 28(5), p.291-294, 3 refs.

Automatic weather station (AWS) units are installed at the north and south ends of the Pegasus blue-ice runway on the Ross Ice Shelf near Ross I. and at the Minna Bluff, Williams Field and Linda AWS sites in support of the meteorology of the blue-ice runway. Determining the differences between the wind speed and direction observations at the Minna Bluff site minus the Pegasus North AWS site is the start of an attempt to determine the potential for wind shear in the vertical at Pegasus Runway. The southerly wind passing Minna Bluff is assumed to continue over Pegasus Runway at the elevation of the Minna Bluff AWS site. Based on the above assumption, the wind-speed difference from the surface to 900 m could be as much as 10 m/s. This difference is not a problem when aircraft are taking off to the south but could be a problem for takeoff to the north. The opposite problem occurs when aircraft are landing.

I-53075

Parish, T.R., Bromwich, D.H., **Katabatic wind forcing on the**

antarctic circumpolar easterlies, *Antarctic journal of the United States,* 1993, 28(5), p.294-295, 4 refs.

To examine the interaction between the katabatic wind regime and the large-scale horizontal pressure field around the antarctic continent, a series of two-dimensional numerical experiments has been conducted using a hydrostatic primitive equation model. The model simulation was carried out for a 24-hour period, by which time a near-steady katabatic wind circulation had evolved. Emphasis is placed on the modification of the horizontal pressure field by the katabatic wind regime. Results are representative of observed features and suggest that the antarctic katabatic wind regime offers at least a supportive role in the development of the easterly wind regime about the continent.

I-53076

Holmes, R.E., Stearns, C.R., Weidner, G.A., **Antarctic automatic weather stations: austral summer 1992-1993,** *Antarctic journal of the United States,* 1993, 28(5), p.296-299, 2 refs.

The National Science Foundation's Office of Polar Programs places automatic weather station (AWS) units in remote areas in Antarctica in support of meteorological research and operations. The basic AWS units measure air temperature, wind speed, and wind direction at a nominal height of 3 m above the surface as well as air pressure at the electronics enclosure. Some units measure relative humidity at 3 m and the air temperature difference between 3 and 0.5 m above the surface at the time of installation. The data are collected by the ARGOS Data Collection System on board the NOAA series of polar-orbiting satellites. A table gives the AWS unit's site name, latitude, longitude, elevation above sea level, and site start date for AWS units installed through 1993. The AWS units are grouped based on the area and usually are related to a single meteorological experiment in the area.

I-53094

Lü, D.R., Zhang, L., Xuan, Y.J., Liu, C.T., **Basic characteristics of atmospheric electric field at Zhongshan Station, Antarctica,** *Antarctic Research (Chinese edition),* Mar. 1995, 7(1), p.36-43, In Chinese with English summary. 11 refs.

Average characteristics of the surface electric field observed at Zhongshan Station are discussed. They include spectra in several time scales, seasonal variations, and typical features in different weather conditions. These fundamental features are defined as "background", and are applied to the analysis of the controlling factor in the formation of average characteristics of the electric field. On the basis of this "background", the response of the atmospheric field to all kinds of disturbances is analyzed. (Auth. mod.)

I-53095

Sun, J.H., Xia, Q.L., Qiu, J.H., Lü, D.R., **Lidar observations of polar stratospheric clouds in Antarctica,** *Antarctic Research (Chinese edition),* Mar. 1995, 7(1), p.44-49, In Chinese with English summary. 5 refs.

A lidar system (694nm) was used to measure stratospheric aerosols at Zhongshan Station between Mar. 27 and Nov. 5, 1993; a total of 53 observations were made. Vertical profiles of stratospheric aerosol backscattering ratio and the integrated backscatter coefficients over a 12-30 km altitude range are presented. The seasonal variation of the integrated backscatter coefficient (IBC) is also presented. A noticeable maximum of the IBC occurs in winter. Polar stratospheric clouds are observed from late May until Sep. The vertical profiles of the stratospheric aerosol backscattering ratio clearly show a double-layer structure: one at an altitude of about 12 km, and another at about 25 km. (Auth. mod.)

I-53122

Kotliakov, V.M., et al, **Latest climatic cycle of the Earth: data from comprehensive studies of Antarctic ice cores** [Posledniĭ klimaticheskiĭ tsikl zemli: dannye kompleksnykh issledovaniĭ antarkticheskikh kernov], *Rossiiskaia akademiia nauk. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ,* Oct. 1991, Vol.73, p.11-18, In Russian with English summary. 22 refs.

DLC GB2401.M37

The ice core obtained at Vostok Station from a depth of 2546 m is constituted of ice formed during 200 thousand years. Isotope temperature data have indicated two interglacials, which started 140 and 15 ka with abrupt warmings, by 11° and 9°C, respectively, and the long Ice Age, 110-15 ka, including two interstadials. During the cooling periods the snow accumulation decreased twice, the concentration of aerosols grew 10-20 times, and concentration of CO_2 in the atmosphere decreased by 25-30%. The coolings were accompanied by an increase of atmospheric circulation, especially of meridional transfer. (Auth. mod.)

I-53145

Lugar, R.M., **FY 1994 ambient air monitoring report for McMurdo Station, Antarctica,** *U.S. Department of Energy. Idaho National Engineering Laboratory,* Dec. 1994, INEL-94/0114, 62p., DE95-008565, Refs. p.31-32.

This report presents the results of ambient air monitoring performed during the 1994 fiscal year in the vicinity of McMurdo Station. Routine monitoring was performed during the 1993-94 austral summer at three locations for airborne particulate matter less than 10 microns (PM-10) at two locations for carbon monoxide, sulfur dioxide, nitrogen oxides, and NO_x. Selected PM-10 filters wre analyzed for arsenic, beryllium, cadmium, chromium, lead, mercury, and nickel. Additional air samples were collected at three McMurdo area locations and at Black I. for determination of the airborne concentration of polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). (Auth. mod.)

I-53147

Poulet, G., Lancar, I.T., Laverdet, G., Le Bras, G., **BrO + ClO reaction and the polar stratospheric ozone,** European Symposium on Physico-chemical Behaviour of Atmospheric Pollutants, 5th, Varese, Italy, Sep. 25-28, 1989. Edited by G. Restelli et al and Commission of the European Communities. Environmental Research Programme. Air Pollution Report No.23, Dordrecht, Kluwer Academic Publishers, 1990, p.190-195, 9 refs.

DLC TD881.P485

In a simulation of photochemical reactions implicated in antarctic ozone depletion, the rate constant of chemical reactions has been measured at 298 K using the discharge flow-mass spectrometry method: $k_1=(1.13\pm0.15) \times 10^{-11}$ cm^3 $molecule^{-1}s^{-1}$. The measurement of the products has led to the determination of the branching ratios: (0.43±0.10) for the OClO channel and (0.12±0.05) for the BrCl one at 298 K. (Auth. mod.)

I-53148

Hayman, G.D., Cox, R.A., **Kinetics of the reaction ClO + ClO=Cl_2O_2 and its implications for polar ozone depletions,** European Symposium on Physico-chemical Behaviour of Atmospheric Pollutants, 5th, Varese, Italy, Sep. 25-28, 1989. Edited by G. Restelli et al and Commission of the European Communities. Environmental Research Programme. Air Pollution Report No.23, Dordrecht, Kluwer Academic Publishers, 1990, p.196-203, 20 refs.

DLC TD881.P485

In a simulation of chemical reactions in the antarctic stratosphere, the Molecular Modulation technique has been applied to study the kinetics of the association reaction of ClO radicals to form a dimer, Cl_2O_2: $ClO + ClO + M = Cl_2O_2 + M$. The ClO radical was generated by the low intensity photolysis at 350 nm of mixtures of Cl_2/Cl_2O or Cl_2/O_3. The kinetics of the ClO radical were followed by UV absorption spectroscopy. Modulation waveforms were recorded as functions of temperature and pressure. The observed rate constants showed a strong pressure dependence at each temperature and were analyzed in terms of the Troe parameterization. (Auth. mod.)

I-53149

Müller, J., **Possible heterogeneous reaction processes inducing depletion of the ozone layer in the stratospheric Antarctica,** European Symposium on Physico-chemical Behaviour of Atmospheric Pollutants, 5th, Varese, Italy, Sep. 25-28, 1989. Edited by G. Restelli et al and Commission of the European Communities. Environmental Research Programme. Air Pollution Report

No.23, Dordrecht, Kluwer Academic Publishers, 1990, p.210-214, 8 refs.

DLC TD881.P485

Increasing methane increases the stratospheric water vapor which during the antarctic winter is frozen in stratospheric particles. The particles are built up according to the specific vapor pressure of the constituting substances: sulfuric acid in the core of the particles and other less volatile substances like HNO_3 and HCl in surrounding shell, together with H_2O-ligands. Induced by the low temperatures in the antarctic winter (-80°C), in addition to HNO_3 and HCl, NO_2 is also frozen on the surface of the ice particles. Due to reactions with HCl located on the surface, CL_2 and other ozone-attacking species are set free. It is postulated that during the antarctic sunrise in spring by charge transfer processes in the particles hydrated electrons are induced which react at the surface with H^+-ions, N_2O and chlorinated halocarbons. By these processes the ozone-attacking radicals H, OH and Cl are generated. (Auth. mod.)

I-53173

Toon, G.C., Blavier, J.F., Szeto, J.T., **Latitude variations of stratospheric trace gases,** *Geophysical research letters,* Nov. 15, 1994, 21(23), p.2599-2602, 7 refs.

The authors present vertical column abundances of H_2O, N_2O, HNO_3, NO_2, O_3, HF, HCl, and $ClNO_3$ determined from solar absorption spectra measured by the JPL MkIV interferometer from the NASA DC-8 aircraft. These observations, taken in 1987 and 1992, covered latitudes ranging from 85°S to 85°N. Although most gases display latitude symmetry, large asymmetries in H_2O, HNO_3, and O_3 are apparent, which can be ascribed to processes enhanced by the colder antarctic winter temperatures. (Auth.)

I-53191

Japanese Antarctic Research Expedition, **Antarctic meteorological data. Special volume No.6. Summary of meteorological observations at Syowa, Mizuho and Asuka Stations, 1961-1993,** Tokyo, Japan Meteorological Agency, 1995, 364p.

This special issue contains recalculated summaries, presented in 9 sections, of surface synoptic observations at Mizuho and Asuka Stations, and ozone and radiation observations at Showa Station and on board research vessels. Corrections for special issue No.5 are presented at the end of the volume.

I-53192

Jones, P.D., **Recent variations in mean temperature and the diurnal temperature range in the Antarctic,** *Geophysical research letters,* June 1, 1995, 22(11), p.1345-1348, 17 refs.

Monthly mean surface temperature data are available from nearly twenty stations in Antarctica for the period since the International Geophysical Year 1957. All but three stations show an increase in mean temperatures over this time, amounting in the average to 0.57°C from 1957 to 1994, warming which occurred before the early 1970s. Since then, there has been no change. The warming has been greatest in the Antarctic Peninsula. Analyses of the less-widely available diurnal temperature range (DTR) data show regions of increase and decrease over Antarctica. An average continental DTR series shows no trend from 1957 to 1992. Analyses for six mid-to-high latitude southern ocean islands show increases in mean temperature from 1961-90. Given the low year-to-year variability in these data, these trends are more significant than for any of the stations on the antarctic continent. The marked decrease in mean temperatures over Antarctica during 1993 and 1994 seems unrelated to sea-ice variations which show little change since the early 1980s. (Auth. mod.)

I-53193

Tabazadeh, A., Toon, O.B., Hamill, P., **Freezing behavior of stratospheric sulfate aerosols inferred from trajectory studies,** *Geophysical research letters,* July 1, 1995, 22(13), p.1725-1728, 23 refs.

Temperature histories for both polar atmospheres based on 10-day back trajectories for six ER-2 flights during 1989 and 1987 are presented. These trajectories along with the properties of the observed PSC (polar stratospheric cloud) particles are used here to infer the physical state of the preexisting sulfuric acid aerosols. Of the ER-2 flights described here, only PSCs observed on the flights of Jan. 24 and 25, 1989 are consistent with the thermodynamics of liquid ternary solutions. The observed PSCs were probably composed of amorphous solid solutions of HNO_3 and H_2O. The temperature histories, recent laboratory measurements and the properties of glassy solids suggest that stratospheric H_2SO_4 aerosols may undergo a phase transition to SAT (sulfuric acid tetrahydrate) upon warming at ≈198 K after going through a cooling cycle to about 194 K or lower. (Auth. mod.)

I-53205

Collins, R.L., Gardner, C.S., **Gravity wave activity in the stratosphere and mesosphere at the South Pole,** *Advances in space research,* 1995, 16(5), p.81-90, 30 refs.

A Rayleigh/resonant lidar was installed at the Amundsen-Scott Station in Dec. 1989 and made observations of the mesosphere and stratosphere through Oct. 1990. The wintertime lidar observations yielded a high resolution data set of sodium (Na) density profiles in the mesosphere and polar stratospheric cloud (PSC) backscatter ratio profiles in the stratosphere. These observations illustrate a variety of wave phenomena present in the antarctic middle atmosphere. The observations of the mesospheric Na layer were used to characterize gravity wave activity in the upper mesosphere between 80 and 105 km. Strong wave activity was observed throughout the winter and exhibited remarkable similarity with observations from lower latitude sites. The mean density variance at the South Pole was similar to that observed at a variety of lower latitude sites. (Auth. mod.)

I-53210

Denning, A.S., Fung, I.Y., Randall, D., **Latitudinal gradient of atmospheric CO_2 due to seasonal exchange with land biota,** *Nature,* July 20, 1995, 376(6537), p.240-243, 31 refs.

Measurements of CO_2 concentrations at remote marine sites have been used with numerical models of atmospheric transport to deduce the location, nature and magnitude of carbon sinks. One of the most important constraints on such estimates is the observed interhemispheric gradient in atmospheric CO_2 concentration. Published models that simulate the transport of trace gases suggest that the gradient is primarily due to interhemispheric differences in fossil-fuel emissions, with small contributions arising from natural exchange of CO_2 with the various carbon reservoirs. Used here is a full atmospheric general circulation model with a more realistic representation of turbulent mixing near the ground to investigate CO_2 transport. The latitudinal (meridional) gradient imposed by the seasonal terrestrial biota is nearly half as strong as that imposed by fossil-fuel emissions. Such a contribution implies that the sinks of atmospheric CO_2 in the Northern Hemisphere must be stronger than previously suggested. The coverage in this study is global, including data for both polar regions, with CO_2 values at the South Pole being deduced at every grid point. (Auth. mod.)

I-53215

Jones, A.E., Shanklin, J.D., **Continued decline of total ozone over Halley, Antarctica, since 1985,** *Nature,* Aug. 3, 1995, 376(6539), p.409-411, 31 refs.

The authors review the status of the ozone hole based on the continued total-ozone measurements at Halley. The springtime ozone hole continues to deepen, with both the October mean and minimum total ozone persistently decreasing. The ozone loss extends into Jan. and Feb., so that significant increases in ultraviolet-B radiation can be expected at the surface over Antarctica during the summer. A signal of ozone loss is now apparent in the spring and summer temperature records, with recent temperatures at the 100-mbar level consistently close to, or colder than, the historical (1957-72) minima for the period Oct. to Jan. These low temperatures may well enable the maintenance of springtime ozone-loss mechanisms until later in the year. (Auth. mod.)

I-53231

Fraser, G.J., **Summer circulation in the antarctic middle atmosphere,** *New Zealand antarctic record,* 1983, 4(3), p.1-3, 6 refs.

In Nov. 1982 a partial reflection drifts system for the measurement of winds in the mesosphere and lower thermosphere was installed as part of the New Zealand Antarctic Research Programme at Scott Base, Ross I. The wind speed and direction are measured once an hour from echoes available at the time within a height range of 67-97 km. Initial observations made during Dec. 1982 show easterly winds between 70 and 90 km, reaching a broad maximum of about 25 m/sec around 85 km. There is a strong (≈10 m/sec) meridional component away from the pole at heights of 85-95 km.

I-53236

Toohey, D.W., Gary, B.L., Langford, J.S., **Investigation of polar stratospheric clouds using remote sensors, *in situ* instruments, and the Perseus remotely piloted aircraft,** Topical Symposium on Combined Optical-Microwave Earth and Atmosphere Sensing, Albuquerque, NM, Mar. 22-25, 1993. Proceedings, Piscataway, New Jersey, Institute of Electrical and Electronics Engineers, Inc., 1993, p.123-125, 3 refs.

DLC G70.39.T67

This paper discusses plans to equip the Perseus aircraft with *in situ* and remote sensors to examine the microphysical and thermodynamic properties of polar stratospheric clouds and the chemical transformations they induce for research in both polar atmospheres. (Auth. mod.)

I-53256

Chamberlin, R.A., Bally, J., **Observed relationship between the South Pole 225-GHz atmospheric opacity and the water vapor column density,** *International journal of infrared and millimeter waves,* May 1995, 16(5), p.907-920, 18 refs.

The authors compare previously reported measurements of South Pole 225 GHz atmospheric opacity, τ, to the column of precipitable water vapor (PWV) which was derived from concurrent upper air soundings. From this comparison they found that $\tau = (2.8\pm0.1) \times 10^{-2} + (6.9\pm0.2) \times 10^{-2} \times \mathrm{PWV}$ with τ in units of nepers/airmass and PWV in units of mm of precipitable H_2O. Results were compared to predictions from Grossman's AT atmospheric transparency model which is widely used in the radio astronomy community. The coefficient of the second term of the above relation, 0.069, was consistent with the predictions from the model; however, the first term, 0.028, which represents the dry air opacity, was about five to ten times larger than expected. Most of this discrepancy between the observed and the predicted dry air opacity can be accounted for by including contributions from continuum emission from N_2 and O_2 as is done in Liebe's MPM atmospheric model. (Auth.)

I-53259

McIntyre, M.E., Pyle, J.A., **Model studies of dynamics, chemistry and transport in the antarctic and arctic stratospheres,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.17-34, Refs. p.33-34.

This work is part of an ongoing effort to improve the understanding of the interacting radiative, chemical and fluid-dynamical processes that control the present behavior and future evolution of the stratospheric ozone layer, motivated by recent observations of polar and mid-latitude ozone depletion. Progress in modelling different aspects of the problem is described, which demand consideration of many nonlinear interactions over a vast range of spatial scales of motion, and over chemical and dynamical time scales from fractions of a second to many years. One fundamental aspect is the comparative study of the antarctic and arctic stratospheres, and the way in which the polar vortex regions fit into the global-scale circulation of the middle atmosphere. A new technique, contour advection, borrowed from recent work on idealized vortex dynamics, is put to use for the first time as a high-powered computational tool for the numerical simulation of tracer advection at unprecedented, and closely controllable, accuracies. (Auth. mod.)

I-53260

James, I.N., **Antarctic circulation in the Universities' Global Atmospheric Modelling Project (UGAMP) model,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.35-41, 13 refs.

The tropospheric circulation over Antarctica, as represented in the UGAMP Global Circulation model, has been diagnosed. Particular emphasis has been placed on the surface wind regime and continent-wide inversion. Persistent surface drainage winds are well simulated over the interior of the antarctic plateau. The model has insufficient resolution to simulate the very strong localized katabatic flows emerging at certain localities around the coastline, although the results do show some indications of local concentrations of low level mass fluxes off the ice sheet. The larger scale upper level circulation in the antarctic region generally verifies well against ECMWF climatology; however, the circumpolar trough is too deep and the surface winds correspondingly too strong. (Auth. mod.)

I-53269

Jones, P.D., Wigley, T.M.L., **Decadal timescale links between Antarctic Peninsula ice-core oxygen-18, deuterium and temperature,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.97-98, 5 refs.

The Antarctic Peninsula region has experienced a long-term warming trend over the 20th century, with the 1971-90 mean at Faraday Station being 1.9°C warmer than the mean over 1904-41 based on expedition reports. For the period prior to 1900 there is conflicting evidence from different data sources. An initial interpretation of isotopic data from ice cores suggests that the 19th century was warmer than the 20th century. In contrast, snow accumulation rate data for the 19th century from the same ice cores suggest lower temperatures. The authors investigate these facts by studying the links between atmospheric temperature over the Antarctic Peninsula, circulation parameters and isotopic data over the period of instrumental records. (Auth. mod.)

I-53281

Sowers, T., Bender, M., **Climate records covering the last glaciation,** *Science,* July 14, 1995, 269(5221), p.210-214, 61 refs.

The oxygen-18/oxygen-16 ratio of molecular oxygen trapped in ice cores provides a time-stratigraphic marker for transferring the absolute chronology for the Greenland Ice Sheet Project (GISP) II ice core to the Vostok and Byrd ice cores in Antarctica. Comparison of the climate records from these cores suggests that near the beginning of the last deglaciation, warming in Antarctica began approximately 3000 years before the onset of the warm Bølling period in Greenland. Atmospheric carbon dioxide and methane concentrations began to rise 2000 to 3000 years before the warming began in Greenland and must have contributed to deglaciation and warming of temperate and boreal regions in the Northern Hemisphere. (Auth.)

I-53284

Iraci, L.T., Middlebrook, A.M., Wilson, M.A., Tolbert, M.A., **Growth of nitric acid hydrates on thin sulfuric acid films,** *Geophysical research letters,* May 15, 1994, 21(10), p.867-870, 16 refs.

Type I polar stratospheric clouds (PSCs) are thought to nucleate and grow on stratospheric sulfate aerosols (SSAs). To model this system, thin sulfuric acid films were exposed to water and nitric acid vapors and subjected to cooling and heating cycles. FTIR spectroscopy was used to probe the phase of the sulfuric acid and to identify the HNO_3/H_2O films that condensed. Nitric acid trihydrate (NAT) was observed to grow on crystalline sulfuric acid tetrahydrate (SAT) films. NAT also condensed in/on supercooled H_2SO_4 films without causing crystallization of the sulfuric acid. This growth is consistent with NAT nucleation from ternary solutions as the first step in PSC formation. (Auth. mod.)

I-53285

Beyer, K.D., Seago, S.W., Chang, H.Y., Molina, M.J., **Composition and freezing of aqueous H_2SO_4/HNO_3 solutions under polar stratospheric conditions,** *Geophysical research letters,* May 15, 1994, 21(10), p.871-874, 13 refs.

The results of laboratory investigations of the freezing behavior of aqueous acid solutions indicate that in the polar stratosphere, H_2SO_4/H_2O aerosol droplets would not freeze at temperatures above the ice frost point in the absence of HNO_3; however, in the presence of typical levels of HNO_3 liquid sulfuric acid aerosols take up significant amounts of HNO_3

and H_2O vapors and freeze much more readily. This is a consequence of the very rapid change in composition of the liquid droplets as the temperature drops to within two to three degrees of the equilibrium temperature at which HNO_3 and H_2O vapors would co-condense to form a liquid solution. In the high latitude stratosphere this HNO_3/H_2O 'dew point' is typically around 192-194 K at 100 mbar. (Auth. mod.)

I-53286

Delmas, R.J., Petit, J.R., **Present antarctic aerosol composition: a memory of ice age atmospheric dust?,** *Geophysical research letters,* May 15, 1994, 21(10), p.879-882, 32 refs.

Data obtained from the chemical analysis (Na, Al, and Ca concentrations) of deep antarctic ice cores has been re-examined. The correlations found between the concentrations of these elements suggest that the Patagonian continental shelf was the dominant aerosol source during the last ice age, the dust being an intimate mixture of marine clay and carbonates. In addition, it is proposed that sea salt deposited on the continental shelf sediments during drop in sea level was emitted and transported jointly with this dust. The present antarctic aerosol composition is very similar to the one deduced from ice core studies for glacial climatic conditions. The authors conclude that present antarctic aerosol originates mainly from ice-age aeolian deposits in South American cold deserts. (Auth. mod.)

I-53311

Sodeau, J.R., Horn, A.B., Banham, S.F., Koch, T.G., **Ionization of chlorine nitrate on ice at 180 K,** *Journal of physical chemistry,* Apr. 20, 1995, 99(16), p.6258-6262, 16 refs.

Fourier Transform Infrared Spectroscopy evidence is provided for the identification of chlorine nitrate $[H_2OCl]^+$ as an intermediate in the ionization of chlorine nitrate on water-ice at the stratospherically relevant temperature of 180 K. The result has important implications for the mechanism by which chlorine is reactivated by polar stratospheric clouds and suggests that the function of water molecules is to reduce the activation energy barrier for chlorine nitrate bond cleavage on the ice. (Auth. mod.)

I-53313

Stamnes, K.H., ed, **Atmospheric Radiation, Tromsø, Norway, June 30-July 1, 1993,** *SPIE—The International Society for Optical Engineering. Proceedings,* 1993, Vol.2049, 371p., Refs. passim. For selected papers see 49-5988 through 49-6002 or I-53314 through I-53318.

DLC QC.912.3.A83 1993

This book contains the proceedings of a meeting on atmospheric radiation held in Tromsø, Norway, June 30-July 1, 1993. Of a total of 41 papers, 15 are pertinent to high latitudes, and of those, five are explicitly pertinent to Antarctica. The papers pertinent to Antarctica deal with polar climate studies from space; solar flux between clouds and the underlying surface; two papers on the effect of atmospheric ozone content on surface UV irradiance; and the infrared optical properties of clouds. Global warming concerns are addressed in several of the papers.

I-53314

Lubin, D., **Polar climate studies from space: overview and current issues,** *SPIE—The International Society for Optical Engineering. Proceedings,* 1993, Vol.2049, Atmospheric Radiation, Tromsø, Norway, June 30-July 1, 1993. Edited by K.H. Stamnes, p.2-8, 31 refs.

DLC QC.912.3.A83 1993

The polar regions are expected to be particularly sensitive to anthropogenic global change. Due to the difficulties in modeling high-latitude climate and the logistical challenges with polar field work, satellite remote sensing will have an increasingly important role to play in polar climate research. For studies of atmospheric radiation and meteorology, accurate cloud detection and classification are crucial. Modern methods for polar cloud classification utilize both multispectral threshold and automated pattern recognition techniques. For monitoring sea ice concentration, passive microwave sensors offer an all-weather advantage over visible or infrared scanners, although over clear-sky scenes the latter can provide a much finer spatial resolution. (Auth.)

I-53315

Gautier, C., Yang, S.R., **Role of cloud-surface interactions on the net surface solar flux in high latitudes: climatic implications,** *SPIE—The International Society for Optical Engineering. Proceedings,* 1993, Vol.2049, Atmospheric Radiation, Tromsø, Norway, June 30-July 1, 1993. Edited by K.H. Stamnes, p.24-36, 13 refs.

DLC QC.912.3.A83 1993

The Discrete Ordinate Radiative Transfer (DISORT) model has been used to investigate the role of cloud-surface interactions on the net surface solar flux in various atmospheric and surface conditions. These model-based results indicate that the partitioning of radiation between the atmosphere and the surface largely varies with cloud and surface conditions. Particularly, the amount of solar radiation absorbed by the atmosphere depends strongly on the type of surface underlying clouds and on cloud properties and type. This suggests that if in a global change scenario, for instance, cloud cover were to remain constant but clouds were to move from overlying the ocean to overlying much more reflecting surfaces, the radiation partitioning would be quite different and so probably would the atmospheric and oceanic circulations. The strongest change would occur if clouds were to move from ocean to snow or ice surfaces, as this could occur at high latitudes, in the vicinity of snow/ice edges. In a scenario where there is no change in cloud type but just a north or south cloud shift in the Southern Hemisphere in the vicinity of Antarctica, where the largest cloud forcing occurs, results suggest that a large change of absorption partitioning between the atmosphere and the surface could take place, if the clouds moved from being mostly located over an oceanic surface to being located mostly over a snow surface (or vice versa). (Auth. mod.)

I-53316

Gautier, C., Ricchiazzi, P., Lubin, D., **Mapping of surface UV over Antarctica using satellite observations,** *SPIE—The International Society for Optical Engineering. Proceedings,* 1993, Vol.2049, Atmospheric Radiation, Tromsø, Norway, June 30-July 1, 1993. Edited by K.H. Stamnes, p.199-214, 19 refs.

DLC QC.912.3.A83 1993

Two methods have been investigated to map UV surface irradiance over Antarctica and the adjacent oceans using satellite remote sensing and ground truth radiometer measurements. Both methods are based on radiance observations from the Advanced Very High Resolution Radiometer (AVHRR) and from the Total Ozone Mapping Spectrometer (TOMS). Surface albedo and cloud optical depth are estimated from visible and infrared AVHRR data, and ozone concentration is derived from TOMS data. Radiative transfer models are applied to retrieve geophysical parameters from satellite data but also to compute the surface UV irradiance. The two methods differ in: (1) the derivation of cloud optical depth, and (2) the type of radiative transfer model used. Preliminary results from both methods are presented and compared with ground measurements made at Palmer Station. (Auth.)

I-53317

Lubin, D., Gautier, C., **Infrared optical properties of clouds over the maritime Antarctic: radiometric FTIR measurements,** *SPIE—The International Society for Optical Engineering. Proceedings,* 1993, Vol.2049, Atmospheric Radiation, Tromsø, Norway, June 30-July 1, 1993. Edited by K.H. Stamnes, p.279-290, 13 refs.

DLC QC.912.3.A83 1993

Spectrally resolved radiometric measurements of middle infrared atmospheric emission can be used in conjunction with detailed radiative transfer calculations to retrieve cloud emissivity, and to estimate cloud liquid water path (LWP), optical depth, and equivalent radius of the droplet size distribution. Using a discrete-ordinates radiative transfer formulation, an algorithm has been developed to retrieve these cloud properties from FTIR data. The algorithm has been successfully applied to a four-month antarctic data set provided by the CalSpace FTIR Spectroradiometer. Radiative transfer calculations were performed to estimate spectral cloud emissivity for a range of cloud optical depth, liquid water content, and equivalent radius, sufficient to bracket values expected in the field. These calculations made use of bi-modal droplet size distributions actually observed in antarctic clouds. Using a least-squares algorithm, a theoretical cloud emission spectrum is chosen which best reproduces a given measured brightness temperature spectrum. The results show marked differences in cloud emissivity between high and low overcast layers, and between clouds with and without precipitation. (Auth. mod.)

I-53318

Koskela, T., Taalas, P., Kyrö, E., **Measured and modelled UV-B spectrum compared with some atmospheric parameters,** *SPIE—The International Society for Optical Engineering. Proceedings,* 1993, Vol.2049, Atmospheric Radiation, Tromsø, Norway, June 30-July 1, 1993. Edited by K.H. Stamnes, p.296-306, 18 refs.

DLC QC.912.3.A83 1993

Spectral ultraviolet measurements in the wavelength range 290 to 325 nm made at Sodankylä, Finland in 1990-92 were used to study the effects of surface albedo, atmospheric total ozone and atmospheric aerosol content on UV irradiance on the surface of the Earth. A two-stream version of the discrete-ordinate-algorithm developed at the University of Alaska Fairbanks was tested against spectral measurements from Sodankylä, Norrköping in Sweden and Palmer Station. Agreement was excellent as regards Palmer Station data. However, with the two Northern Hemispheric data sources all model results were roughly 40% higher in the 305-325 nm range and matched below 305 nm within ±20%. A case study with data having common optical air masses and total ozone contents from all three sources revealed unexpectedly high irradiances at Palmer Station. The spectral ranges available were 290 to 325 nm in Sodankylä, 290 to 320 nm in Norrköping and 279.9 to 380.22 nm at Palmer Station. All data were presented at a resolution of about 0.5 nm. Surface UV irradiance at air mass 1.4±0.05 is 50 to 80% stronger in Antarctica than in Scandinavia with roughly similar total ozone contents. This result was unexpected and remains to be explained. (Auth. mod.)

I-53366

Danilin, M.Y., McConnell, J.C., **Stratospheric effects of bromine activation on/in sulfate aerosol,** *Journal of geophysical research,* June 20, 1995, 100(D6), p.11,237-11,243, 28 refs.

Heterogeneous reactions on/in stratospheric sulfate aerosol and polar stratospheric clouds are important in the photochemical balance of the stratosphere. Recent laboratory measurements indicate that heterogeneous reactions with bromine compounds are possible under stratospheric conditions. Herein a box photochemical model of the stratosphere with a detailed heterogeneous module is presented to evaluate the effect of heterogeneous reactions of the inorganic bromine for background and volcanic conditions at 60°S and 50 mbar. For the conditions studied the most important reaction is the hydrolysis of $BrONO_2$ on the aerosol, especially for volcanic conditions. It results in the indirect increase of the ClO_x fraction due to the suppression of NO_x (thus reducing $ClONO_2$) and the direct release of ClO_x due to additional consumption of HCl. The NO_x decrease is pronounced going into winter and leads to a ClO activation to about 0.5 ppvb 1 to 2 weeks earlier than without the heterogeneous reactions of bromine species. Due to the temperature sensitivity of the solubility of HCl, the reaction $HOBr + HCl(a) \rightarrow BrCl + H_2O$ results in direct activation of ClO at temperatures below ≈205 K. The enhanced processing for the bromine reactions leads to an additional increase ≈30% in ozone depletion for volcanic conditions during winter. (Auth. mod.)

I-53367

Robock, A., Free, M.P., **Ice cores as an index of global volcanism from 1850 to the present,** *Journal of geophysical research,* June 20, 1995, 100(D6), p.11,549-11,567, 87 refs.

To evaluate an important cause of past climate change, climate researchers need reliable estimates of volcanic aerosol loading in the atmosphere. Ice core acidity and sulfate records, because they contain physical evidence of atmospheric loading, are a promising source of information on past volcanic aerosols, but these records contain large nonvolcanic signals as well. This study compares Northern Hemisphere (NH) and Southern Hemisphere (SH) annual-average versions of five indices with eight NH and six SH ice core records for the period 1850 to the present in an attempt to identify the volcanic signal common to all records. The indices are all highly correlated with each other. For the NH, although the individual ice core records are, in general, not well correlated with each other or with any of the indices, a composite derived from averaging the cores, the ice core-volcano index (IVI), shows promise as a new index of volcanic aerosol loading. This new index correlates well with the existing non-ice core volcanic indices and with high-frequency temperature records. For the SH the individual ice cores and indices are better correlated. The SH IVI is again highly correlated with all indices and individual ice cores but not with high-frequency temperature records. For both hemispheres the Southern Oscillation index shows no significant correlation with the volcanic indices, ice cores or the IVI, thus providing no evidence for the impact of volcanic eruptions on El Niño/Southern Oscillation events. (Auth. mod.)

I-53368

Bacmeister, J.T., Schoeberl, M.R., Summers, M.E., Rosenfield, J.E., Zhu, X., **Descent of long-lived trace gases in the winter polar vortex,** *Journal of geophysical research,* June 20, 1995, 100(D6), p.11,669-11,684, 31 refs.

Recent observations of CH_4 and HF from the UARS Halogen Limb Occultation Experiment (HALOE) suggest that vigorous descent occurs within the polar winter vortex with "mesospheric" values of CH_4 evident down to 30 mbar. This study shows that a highly accurate two-dimensional model advection scheme coupled with a modern radiation scheme, parameterized planetary and gravity wave drag algorithms can produce tracer distributions consistent with HALOE observations. The modeled tracer distribution within the polar vortex is found to be principally dependent on the strength of dynamical drag in the middle atmosphere and the strength of the planetary wave forcing. However, the strong downward transport of tracers at the poles during winter can be disrupted in midwinter by planetary wave mixing. Thus the weaker planetary wave forcing in the Southern Hemisphere winter allows for a more coherent descent of long-lived tracers from the mesosphere than during the Northern Hemisphere winter. Multiple-year integrations of the model reveal a general circulation of the stratosphere which lofts tracers to mesospheric altitudes. Material removed from the mesosphere returns to the stratosphere principally within the polar regions. (Auth. mod.)

I-53369

Balsey, B.B., et al, **On the lack of southern hemisphere polar mesophere summer echoes,** *Journal of geophysical research,* June 20, 1995, 100(D6), p.11,685-11,693, 23 refs.

This report presents VHF radar observations of the southern high-latitude mesopause region using wind profilers that were installed recently on King George I., and Ushuaia, Argentina. The observations, which were made during Jan. and Feb. 1993, show almost no evidence of so-called polar mesosphere summer echoes, or PMSE. Since these echoes are a predominant feature of the northern high-latitude mesosphere in summer, their absence in the Southern Hemisphere is both surprising and intriguing. This paper presents evidence demonstrating the virtual absence of the echoes and demonstrates that the systems employed were capable of detecting them had they been present. Also outlined are some of the consequences of this intriguing result, which are supported by observed hemispheric differences in polar mesospheric clouds, mesospheric temperature, upper atmospheric gravity wave activity, and mean circulation patterns. (Auth. mod.)

I-53373

Gallée, H., ed, **Simulation of the mesocyclonic activity in the Ross Sea, Antarctica,** *Monthly weather review,* July 1995, 123(7), p.2051-2069, 44 refs.

The mesocyclonic activity in the southwestern Ross Sea is examined, with emphasis on its forcing by katabatic winds. The three-dimensional version of the meso-γ-scale primitive equation model Modèle Atmosphérique Régional is used in which a representation of cloud microphysical processes has been introduced. Idealized boundary conditions are prescribed. In particular, the ocean is assumed to be completely ice-free or partially ice-covered. The former case corresponds to a fall situation that coincides with the climatological maximum of estimated precipitation at McMurdo Station on Ross I. Due to the propagation of katabatic winds over the ocean, boundary layer fronts form. Clouds are generated in the fronts. A surface pressure trough also forms and extends northeastward from Terra Nova Bay. Mesocyclones are simulated in the trough. When the ocean is ice-free, strong sensible heat fluxes toward the atmosphere amplify the strength of the trough up to typically observed values. In this case, snow precipitation is associated with the boundary layer fronts and occurs in particular over McMurdo Sound. It is also found that latent heat release due to precipitation formation in the fronts does not significantly affect the deepening of the trough. (Auth. mod.)

I-53375

Berland, B.S., Haynes, D.R., Foster, K.L., Tolbert, M.A., George, S.M., **Characterization of model polar stratospheric cloud films using laser induced thermal desorption and optical interference techniques,** *SPIE-The International Society for Optical Engineering. Proceedings,* 1994, Vol.2125, Laser techniques for surface science. Edited by H.L. Dai et al, p.31-51, 30 refs.

DLC TA418.7.L36

Optical interference techniques were used to measure the real index of refraction of nitric acid/ice films representative of type I and type II polar stratospheric clouds (PSCs). Possible candidates for type I PSCs include amorphous HNO_3/H_2O mixtures, as well as crystalline nitric acid trihydrate (NAT), dihydrate (NAD), and monohydrate (NAM). Amorphous and crystalline model PSC films were grown in vacuum by vapor deposition on single-crystal Al_2O_3 substrates at low temperatures. The real indices of refraction at λ=632 nm were measured for these films using the time-dependent optical interference during film deposition. The stoichiometries of the HNO_3/H_2O films were determined using laser induced thermal desorption (LITD) techniques. For the amorphous films at 130 K, the refractive indices increased with increasing nitric acid content. The values ranged from n=1.31 for pure ice to n=1.47 for nearly pure nitric acid. A Lorentz-Lorenz analysis was in good agreement with the measured refractive indices of the amorphous HNO_3/H_2O films as a funtion of HNO_3 mole fraction. Growth of HNO_3/H_2O films at 175 K resulted in the formation of either crystalline NAM or NAD. The crystalline indices were substantially higher than their amorphous analogs. (Auth. mod.)

I-53377

Van Weele, M., Vilà-Gureau de Arellano, J., Kuik, F., **Combined measurements of UV-A actinic flux, UV-A irradiance and global radiation in relation to photodissociation rates,** *Tellus,* July 1995, 47B(3), p.353-364, 26 refs.

At present, photodissociation rates at ground level are mainly estimated from empirical expressions that relate the irradiance ultraviolet A or global (UV-A) to photodissociation rates. In this paper, a comparison is made between the UV-A actinic flux, which is the appropriate radiometric quantity to estimate photodissociation rates, and the two other commonly used radiometric quantities: UV-A irradiance and global radiation. The comparison is based on measurements of the 3 quantities at various locations in the Azores, Antarctica, and the Netherlands. (Auth. mod.)

I-53390

Gonella, J.A., **Ocean-atmosphere coupling and short term fluctuations of earth rotation,** *Oceanologica acta,* Jan. 1987, 10(1), p.123-127, 21 refs.

Several authors have shown that measurements of fluctuations in length-of-day (l.o.d.) and angular momentum of the atmosphere are strongly correlated; these measurements support the assumption that the entire planet is a closed dynamic system. Accelerations of angular momentum of the atmosphere occur simultaneously with decelerations of the rotation of the solid earth, and vice versa, with l.o.d. change of about one millisecond in an annual period. In this paper, only the minor role of the world ocean is discussed. The southern ocean, which is wind-driven, could make, at the most, a contribution of only a few percent of the total change of l.o.d. In the oceans, phase velocities of barotropic waves range between 2,000 to 20,000 km/day; these large free oceanic waves could act on l.o.d. changes only in the frequency band ranging from 0.1 to 1 cycle per day. On the annual and seasonal scales, it is emphasized that the global water balance within the water cycle (evaporation, condensation, precipitation) could have a larger effect than oceanic circulation on earth-rotation. (Auth. mod.)

I-53391

Nakamura, N., **Modified Lagrangian-mean diagnostics of the stratospheric polar vortices. Part 1: formulation and analysis of GFDL SKYHI GCM,** *Journal of the atmospheric sciences,* June 1, 1995, 52(11), p.2096-2108, 30 refs.

A two-dimensional diagnostic model of tracer transport in the polar stratospheres is formulated. The model is a generalization of the area analysis method devised by Butchart and Remsberg but uses the mass element enclosed by the contours of a quasi-conservative tracer on a given isentropic surface as a "meridional" coordinate. This modified Lagrangian-mean coordinate is transparent to the advective effects of the winds, and thus unambiguously extracts the nonconservative effects on the tracer distribution. The derived transport equation takes an equivalent advective form; that is, the tracer contours are "advected" by the mean nonconservative mass flow while there are no "eddy flux" contributions. Hence, the mass flux is implied in the motion of the tracer contours. Not only is this model conceptually simple, it is also computationally economical for analyzing large, high-resolution datasets since time averaging can be omitted to define a robust mean field of the tracer. The model is used to diagnose the N_2O mixing ratio and potential vorticity simulated in the high-resolution, Geophysical Fluid Dynamics Laboratory SKYHI GCM. The analysis not only identifies the boundary of the polar vortex better than the Eulerian zonal-mean models but highlights how the nonconservative processes (diabatic heating and friction) contribute to the formation of the vortex edge. (Auth. mod.)

I-53395

Quadrennial Ozone Symposium, Charlottesville, VA, June 4-13, 1992, Hudson, R.D., ed, **Ozone in the troposphere and stratosphere. Part 1,** NASA conference publication 3266, Greenbelt, MD, U.S. National Aeronautics and Space Administration. Goddard Space Flight Center, 1994, 436p. + append., N95-10590, Refs. passim. For selected papers see 49-3001, 49-6287 through 49-6315, or I-52204 and I-53396 through I-53406.

This book contains Part 1 of the papers presented at the 1992 Quadrennial Ozone Symposium held in Charlottesville, VA. Most of the approximately 100 papers did not specify a particular range of latitudes or dealt with low or mid-latitudes but 29 were pertinent to high latitudes, and of those, 11 were pertinent to Antarctica. The papers dealt with global ozone measurements from ground stations, ozonesonde, and satellite; modeling of stratospheric aerosol surface processes; modeling of radiative and temperature effects on global ozone; possible relativistic electron induced ozone depletion; modeling of the effects of emissions from proposed stratospheric aircraft on ozone; effects of the quasi-biennial oscillation on ozone; solar proton effects on ozone; and a general circulation model of global ozone depletion.

I-53396

Oltmans, S.J., Levy, H., II, **Ozone measurements from a global network of surface sites,** Quadrennial Ozone Symposium, Charlottesville, VA, June 4-13, 1992. Ozone in the troposphere and stratosphere. Part 1. Edited by R.D. Hudson, Greenbelt, MD, U.S. National Aeronautics and Space Administration. Goddard Space Flight Center, 1994, p.19-23, N95-10595, 13 refs.

From a network of surface ozone monitoring sites distributed primarily over the Atlantic and Pacific oceans, the seasonal, day-to-day, and diurnal patterns are delineated. At most of the Northern Hemisphere sites there is a spring maximum and late summer or autumn minimum. All the sites in the Southern Hemisphere show winter maxima and summer minima. Air of tropical origin has much lower ozone concentrations than air from higher latitudes. At four of the locations (Barrow, AK; Mauna Loa, HI; American Samoa; and South Pole) there are 15 through 20-year records which allow one to look at longer term changes. At Barrow there has been a large summer increase over the 20 years of measurements. At the South Pole, on the other hand, summer decreases of nearly 25% over the 16 years of measurements have led to a significant overall decline in surface ozone amounts during that period. (Auth. mod.)

I-53397

London, J., **Long-term observed ozone trends in the free troposphere and lower stratosphere,** Quadrennial Ozone Symposium, Charlottesville, VA, June 4-13, 1992. Ozone in the troposphere and stratosphere. Part 1. Edited by R.D. Hudson, Greenbelt, MD, U.S. National Aeronautics and Space Administration. Goddard Space Flight Center, 1994, p.181-185, N95-10633, 11 refs.

The vertical distributions of ozone trends in the free troposphere and lower stratosphere were derived from ozonesonde observations taken over an average period of about 20 years. The results for the annual trends show a consistent pattern of increased ozone of about 1%/yr to 2%/yr up to about 300 mb and decreased ozone of about -0.6%/yr from about 100 to 50 mb. Statistically significant positive trends found in mid-troposphere (about 500 mb) at a set of representative stations in the Northern Hemisphere have little apparent seasonal variation. Negative trends are generally strongest at 50-70 mb with a tendency to be larger during spring. A highly significant negative trend of about -5%/yr is found near 100 mb over Showa Station (69°S) during spring. (Auth.)

I-53398

Herman, J.R., Stolarski, R.S., McPeters, R., Larko, D., **Global distribution of ozone destruction rates obtained from 13 years of Nimbus/TOMS data (1979-1991),** Quadrennial Ozone Symposium, Charlottesville, VA, June 4-13, 1992. Ozone in the troposphere and stratosphere. Part 1. Edited by R.D. Hudson, Greenbelt, MD, U.S. National Aeronautics and Space Administration. Goddard Space Flight Center, 1994, p.244-148, N95-10649, 17 refs.

Long-term ozone trends (percentage change) have been computed from 13 years of Nimbus/TOMS (Total Ozone Mapping Spectrometer) data as a function of latitude, longitude, and month for the period Jan. 1, 1979 to Dec. 31, 1991. In both hemispheres, the ozone column content has decreased at latitudes above 30° by amounts that are larger than predicted by homogeneous chemistry models for the 13-year time period. The largest rates of ozone decrease occur in the Southern Hemisphere during winter and spring, with recovery during the summer and autumn. The large winter ozone loss rates are consistent with observed low stratospheric temperatures, ice-cloud formation, and heterogeneous chemistry at middle and high latitudes. There are similar, but smaller changes observed in the Northern Hemisphere. At mid-latitudes, there are increased zonal average ozone depletion rates that correspond to 5 geographically localized regions of increased ozone depletion rates. Only the equatorial band between plus or minus 20° shows little or no long-term ozone change since Jan. 1979. The long-term winter ozone depletion rate data for both hemispheres suggests that heterogeneous chemistry processes may operate over a wide range of latitudes during half of the year. (Auth.)

I-53399

Connell, P.S., Kinnison, D.E., Wuebbles, D.J., Burley, J.D., Johnston, H.S., **Effects of stratospheric aerosol surface processes on the LLNL two-dimensional zonally averaged model,** Quadrennial Ozone Symposium, Charlottesville, VA, June 4-13, 1992. Ozone in the troposphere and stratosphere. Part 1. Edited by R.D. Hudson, Greenbelt, MD, U.S. National Aeronautics and Space Administration. Goddard Space Flight Center, 1994, p.302-306, N95-10662, 8 refs.

Heterogeneous chemical processes associated with stratospheric sulfuric acid aerosol are incorporated into the LLNL (Lawrence Livermore National Laboratory), two-dimensional, zonally averaged model of the troposphere and stratosphere. The primary interest is in changes in partitioning within the Cl- and N- families in the lower stratosphere. The heterogeneous hydrolysis reactions $N_2O_5 + H_2O(\text{aerosol}) \rightarrow 2HNO_3(\uparrow)$ and $ClONO_2 + H_2O(\text{aerosol}) \rightarrow HOCl(\uparrow) + HNO_3(\uparrow)$ are considered alone and in combination with the proposed formation of nitrosyl sulfuric acid (NSA) in the aerosol and its reaction with HCl, that is, $HCl + NOHSO_4(\text{aerosol}) \rightarrow ClNO(\uparrow) + H_2SO_4$. Inclusion of these processes produces significant changes in partitioning in the NO_y and ClO_y families in the middle stratosphere. $ClONO_2$ becomes the dominant inorganic Cl-containing species, especially at southern high latitudes. (Auth. mod.)

I-53400

Karol', I.L., Frol'kis, V.A., **Model evaluation of the radiative and temperature effects of the ozone content changes in the global atmosphere of 1980s,** Quadrennial Ozone Symposium, Charlottesville, VA, June 4-13, 1992. Ozone in the troposphere and stratosphere. Part 1. Edited by R.D. Hudson, Greenbelt, MD, U.S. National Aeronautics and Space Administration. Goddard Space Flight Center, 1994, p.338-341, N95-10671, 9 refs.

Radiative and temperature effects of the observed ozone and greenhouse gas atmospheric content changes in 1980-1990 are evaluated using the two-dimensional energy balance radiative-convective model of the zonally and annually averaged troposphere and stratosphere. Calculated radiative flux changes for standard conditions quantitatively agree with their estimates in the WMO/UNEP 1991 review. Model estimates indicate rather small influence of ozone depletion in the lower stratosphere on the greenhouse tropospheric warming rate, being more significant in the non-tropical Southern Hemisphere. The calculated cooling of the lower stratosphere is close to the observed temperature trends there in the last decade. (Auth.)

I-53401

Aikin, A.C., **Search for relativistic electron induced stratospheric ozone depletion,** Quadrennial Ozone Symposium, Charlottesville, VA, June 4-13, 1992. Ozone in the troposphere and stratosphere. Part 1. Edited by R.D. Hudson, Greenbelt, MD, U.S. National Aeronautics and Space Administration. Goddard Space Flight Center, 1994, p.342-346, N95-10672, 12 refs.

Possible ozone changes at 1 mb associated with the time variation and precipitation of relativistic electrons are investigated by examining the Nimbus 7 SBUV ozone data set and corresponding temperatures derived from NMC data. No ozone depletion was observed in high-latitude summer when temperature fluctuations are small. In winter more variation in ozone occurs, but large temperature changes make it difficult to identify specific ozone decreases as being the result of relativistic electron precipitation. No correlation has been found between ozone depletions over Scott Base and the south geomagnetic pole and the solar events studied. (Auth. mod.)

I-53402

Considine, D.B., Douglass, A.R., **Impact of stratospheric aircraft on calculations of nitric acid trihydrate cloud surface area densities using NMC temperatures and 2D model constituent distributions,** Quadrennial Ozone Symposium, Charlottesville, VA, June 4-13, 1992. Ozone in the troposphere and stratosphere. Part 1. Edited by R.D. Hudson, Greenbelt, MD, U.S. National Aeronautics and Space Administration. Goddard Space Flight Center, 1994, p.347-350, N95-10673, 6 refs.

A parametrization of NAT (nitric acid trihydrate) clouds is developed for use in 2D models of the stratosphere. The parametrization uses model distributions of HNO_3 and H_2O to determine critical temperatures for NAT formation as a function of latitude and pressure, based on data from the NMC (National Meteorological Center). The increase in the NAT cloud formation in the presence of a fleet of stratospheric aircraft is also considered. The stratospheric aircraft NO_x and H_2O perturbations result in increased HNO_3 as well as H_2O. This increases the probability of NAT formation substantially, especially if it is assumed that the aircraft perturbations are confined to a corridor region. The north polar occurrence probability of NAT clouds at the 90 mb surface peaks in December/January. The south polar occurrence probability peaks in August, and is large in both July and September. Probabilities at the 50 mb surface remain about the same in the northern and southern polar regions. (Auth. mod.)

I-53403

Natarajan, M., Callis, L.B., Boughner, R.E., Lambeth, J.D., **Impact of stratospheric aircraft emissions on ozone: a two dimensional model study,** Quadrennial Ozone Symposium, Charlottesville, VA, June 4-13, 1992. Ozone in the troposphere and stratosphere. Part 1. Edited by R.D. Hudson, Greenbelt, MD, U.S. National Aeronautics and Space Administration. Goddard Space Flight Center, 1994, p.367-369, N95-10678, 6 refs.

Atmospheric perturbations caused by the emission of nitrogen oxides from a projected fleet of stratospheric aircraft are studied with a two-dimensional chemistry transport model. Photochemistry of the lower stratosphere, the region where these aircraft may fly, is now known to be influenced by heterogeneous reactions involving sulfuric acid aerosols. This study examines the sensitivity of the atmospheric effects of aircraft to heterogeneous reactions. It is found that heterogeneous reactions make the lower stratospheric ozone less sensitive to perturbations in the odd nitrogen level. The calculated reduction in global ozone due to NO_x injection from a fleet of Mach 2.4 aircraft is 1.28% if gas phase reactions only are considered in the model, and 0.06% if heterogeneous reactions are included. In the high latitude Southern Hemisphere, ozone reductions of 0.8% are seen. (Auth. mod.)

I-53404

Gruzdev, A.N., Mokhov, I.I., **Quasi-biennial oscillation in total ozone: global behaviour derived from ground-based measurements,** Quadrennial Ozone Symposium, Charlottesville, VA, June 4-13, 1992. Ozone in the troposphere and stratosphere. Part 1. Edited by R.D. Hudson, Greenbelt, MD, U.S. National Aeronautics and Space Administration. Goddard Space Flight Center, 1994, p.397-400, N95-10686, 8 refs.

The quasi-biennial oscillation (QBO) in total ozone (TO) is studied on the basis of TO measurements at the world ground-based ozone network during 1972-1988. The TO content is on the whole greater in the tropical belt and smaller in high latitudes during the westerly phase of the QBO of the equatorial stratospheric 50 mb wind than during the easterly phase in all seasons. The appropriate TO difference (westerly category minus easterly category) displays certain space structures changing during a year. There are regions with the peculiar annual evolution of this difference, particularly in the Arctic and Antarctic. Different regimes of the TO QBO in the Southern Hemisphere middle and polar latitudes are due to dynamical isolation of the antarctic stratosphere during the period of the winter circumpolar vortex. The spring reversal of stratospheric circulation which supplies the SH polar region with ozone causes the spring TO minimum over the Antarctic during that period. (Auth. mod.)

I-53405

Stephenson, J.A.E., Scourfield, M.W.J., **Solar proton effects on austral ozone during the final months of 1989,** Quadrennial Ozone Symposium, Charlottesville, VA, June 4-13, 1992. Ozone in the troposphere and stratosphere. Part 1. Edited by R.D. Hudson, Greenbelt, MD, U.S. National Aeronautics and Space Administration. Goddard Space Flight Center, 1994, p.405-408, N95-10688, 9 refs.

Intense solar activity during 1989 prompted six major particle events. Four of these occurred between August and December. Energetic solar protons are a natural source of ozone depletion due to the nitric oxides they produce in the polar atmospheres. In particular, modeling of an event that peaked on Oct. 20 (with >10 MeV proton flux of 73,000 particles $cm^{-2}s^{-1}ster^{-1}$) yields 55% column density enhancements of NO over the southern polar cap. An increase in the spatial extent of the August to December 1989 ozone hole over a region extending from 90°S to 70°S, compared to previous years of moderate solar activity (1984 to 1988), was detected. The enhancement of NO_x concentrations due to SPE's (solar proton events) may be seen as a likely source to increase the probability of NAT PSC (nitric acid trihydrate polar stratospheric cloud) formation. However, the addition of NO_x may in some instances result in larger ice particles rather than increasing the area of coverage of PSCs. In addition, extra odd nitrogen will have no effect in regions where processing of ozone is complete. (Auth. mod.)

I-53406

Dudek, M.P., Wang, Y.C., Liang, X.Z., Li, Z., **General circulation model study of the climatic effect of observed stratospheric ozone depletion between 1980 and 1990,** Quadrennial Ozone Symposium, Charlottesville, VA, June 4-13, 1992. Ozone in the troposphere and stratosphere. Part 1. Edited by R.D. Hudson, Greenbelt, MD, U.S. National Aeronautics and Space Administration. Goddard Space Flight Center, 1994, p.433-436, N95-10694, 5 refs.

Satellite measurements have shown a significant reduction in the stratospheric ozone over the middle and high latitudes of both hemispheres between the years 1979 and 1991. Recent studies indicate that the net effect depends not only on latitudes and seasons but also on the response of the lower stratospheric temperature. A general circulation model (GCM) is used to calculate the climatic effect due to stratospheric ozone depletion and compare the effect with that due to observed increases of trace gases CO_2, CH_4, N_2O, and CFCs for the period 1980-1990. In the simulations, the middle and high latitudes in both hemispheres show column ozone losses, while the tropics show a slight increase from February to July. The antarctic ozone hole is evident, with over a 40% reduction in column ozone at the pole in October and November. (Auth. mod.)

I-53423

Murphy, D.M., Gary, B.L., **Mesoscale temperature fluctuations and polar stratospheric clouds,** *Journal of the atmospheric sciences,* May 15, 1995, 52(10), p.1753-1760, 34 refs.

Remote sensing measurements of temperature fluctuations on isentropic surfaces, as well as *in situ* measurements, are used to show that even high-resolution trajectory calculations seriously underestimate the rate of change of temperature experienced by air parcels. Rapid temperature fluctuations will affect the nucleation of polar stratospheric cloud (PSC) droplets and could promote the formation of metastable phases in PSCs. Mesoscale temperature fluctuations are large enough to produce significant departures from equilibrium in established PSCs. The large cooling rates experienced by air parcels have important implications for denitrification and dehydration: nearly all condensation nuclei should be activated when a PSC is first formed and mass must be redistributed to larger aerosols during the evolution of a PSC if denitrification is to occur. (Auth.)

I-53424

Trounday, B., Perthuis, L., Strebelle, S., Farrara, J.D., Mechoso, C.R., **Dispersion properties of the flow in the southern stratosphere during winter and spring,** *Journal of geophysical research,* July 20, 1995, 100(D7), p.13,901-13,917, 18 refs.

The STRATEOLE project, organized by France's Centre National de la Recherche Scientifique, will release a large number of isopycnal balloons to drift in the lower stratosphere of the Southern Hemisphere. In preparation for STRATEOLE this paper studies the structure and dispersion properties of the flow in the lower stratosphere at high southern latitudes during winter and spring. The approach for investigation is based on computing trajectories of fluid parcels and isopycnal balloons using the velocity field obtained on-line during simulations with a three-dimensional primitive-equation model of the stratosphere and mesosphere. A scheme for computation of isopycnal balloon trajectories is devised, and a method for estimating the location of the polar night vortex edge is developed. It is found that trajectories of fluid parcels initiated well inside the vortex remain within the vortex for a period of months. A small number of fluid parcels released near the vortex edge cross the edge with about an equal number of crossings from inside to outside the vortex as from outside to inside. The isopycnal balloons show a stronger tendency to cross the vortex edge than do fluid parcels. (Auth. mod.)

I-53425

Vömel, H., Oltmans, S.J., Hofmann, D.J., Deshler, T., Rosen, J.M., **Evolution of the dehydration in the antarctic stratospheric vortex,** *Journal of geophysical research,* July 20, 1995, 100(D7), p.13,919-13,926, 14 refs.

In 1994 an intensive program of balloon-borne frost point measurements was performed at McMurdo. During this program a total of 19 frost point soundings was obtained between Feb. 7 and Oct. 5, which cover a wide range of undisturbed through strongly dehydrated situations. Together with several soundings from Amundsen-Scott Station between 1990 and 1994, they give a comprehensive picture of the general development of the dehydration in the antarctic stratospheric vortex. The period of dehydration typically starts around the middle of June, and a rapid formation of large particles leads to a fast dehydration of the vortex. The evaporation of falling particles leads to rehydration layers, which have significantly higher water vapor concentrations than the undisturbed stratosphere. Through the formation of these rehydration layers in the early stages of the dehydration, particle fall speed of $\frac{1}{3}$ km/d and thus a mean particle size of 4 µm is estimated. (Auth. mod.)

I-53426

Luo, M., Cicerone, R.J., Russell, J.M., III, **Analysis of Halogen Occultation Experiment HF versus CH_4 correlation plots: chemistry and transport implications,** *Journal of geophysical research,* July 20, 1995, 100(D7), p.13,927-13,937, 25 refs.

The relationship between stratospheric CH_4 and hydrogen fluoride (HF) observed simultaneously by the Halogen Occultation Experiment (HALOE) on the Upper Atmosphere Research Satellite (UARS) has been examined globally. The meridional structures of the two long-lived species for the equinox and solstice seasons are found to be similar. Their surfaces of constant mixing ratio, however, are found to not coincide. The isopleth of CH_4 graphed as pressure versus latitude shows a steeper slope than that of HF. This feature can be clearly seen from the scatterplots of CH_4 versus HF for a sequence of latitude regions. In general, CH_4-HF correlation plots are characterized by tightly fitted curves for different latitude bands. A two-dimensional model simulation of CH_4 and HF agrees well with HALOE observations, and shows that the altitude-latitude dependences of CH_4 removal and HF production rates play an important role in determining global CH_4-HF correlations. It is found that the CH_4-HF correlation inside the antarctic vortex is nearly linear and is shifted from that of outside the vortex and from that of polar late-summer before the formation of the vortex. The obvious shift of HF values on CH_4 surfaces or vice versa is usually found across dynamical barriers. (Auth. mod.)

I-53427

Eckman, R.S., et al, **Stratospheric trace constituents simulated by a three-dimensional general circulation model: comparison with UARS data,** *Journal of geophysical research,* July 20, 1995, 100(D7), p.13,951-13,966, 50 refs.

Constituent distributions are presented from the NASA Langley three-dimensional general circulation model, incorporating a comprehensive-chemistry scheme. A 7-year gas phase model simulation was performed to investigate long-term model stability. In addition, a 1-year simulation was made using parameterized polar heterogeneous processes and reactions occurring on sulfate aerosols. The results of these simulations are compared with species climatologies and with satellite data sets in order to characterize and evaluate model performance and identify aspects of the chemical scheme requiring improvement. The agreement between the modeled seasonal variation of total ozone and the measurement climatologies is satisfactory but shows some differences with respect to the depth and persistence of the southern springtime ozone depletion. (Auth. mod.)

I-53428

Douglass, A.R., et al, **Interhemispheric differences in springtime production of HCl and $ClONO_2$ in the polar vortices,** *Journal of geophysical research,* July 20, 1995, 100(D7), p.13,967-13,978, 29 refs.

Upper Atmospheric Research Satellite observations of O_3 and ClO (Microwave Limb Sounder), $ClONO_2$ and HNO_3 (Cryogenic Array Etalon Spectrometer), NO, NO_2, and HCl (Halogen Occultation Experiment), and model calculations are used to produce an exposition of the different processes through which the reservoir gases $ClONO_2$ and HCl are reformed at the end of the polar winter. Comparison of the observations within the polar vortices shows that HCl increases more rapidly in the antarctic vortex in spring than in the arctic vortex. Model analysis shows that this occurs because the O_3 concentrations in the southern vortex fall well below those in the northern vortex. The Cl/ClO fraction calculated for the Southern Hemisphere is therefore up to 30 times higher, leading to rapid HCl formation by Cl + CH_4. The concentrations of NO observed by HALOE are substantially lower for the Northern Hemisphere than for the Southern Hemisphere, even for similar values of the concentration of HNO_3 and the production of NO_x from HNO_3 through photolysis and reaction with OH. This is consistent with the dependence of the NO/NO_x ratio on the O_3 concentration, i.e., the daytime production rate of NO_2 via NO + O_3 is reduced, leading to higher NO in the Southern Hemisphere. (Auth. mod.)

I-53429

De Zafra, R.L., Reeves, J.M., Shindell, D.T., **Chlorine monoxide in the antarctic spring vortex. 1. Evolution of midday vertical profiles over McMurdo Station, 1993,** *Journal of geophysical research,* July 20, 1995, 100(D7), p.13,999-14,007, 18 refs.

A prolonged record of emission spectra from chlorine monoxide in the vicinity of McMurdo Station during formation of the austral spring ozone hole of 1993 has been obtained. These spectra were processed to obtain vertical mixing ratio profiles by deconvolution of pressure-broadened line shapes. The resulting profiles give a detailed evolution for both altitude distribution and mixing ratio of ClO during development of a major ozone hole event. In early September, very strong emission was observed from pressure-broadened low-altitude ClO. A brief significant decrease in ClO content occurred in late September when the inner vortex edge approached McMurdo, signifying that a strong gradient in ClO exists near the inner vortex edge. A rapid and apparently final deactivation of chlorine in the lower stratosphere was observed to start about Oct. 1-2. The findings of initially large values of ClO well above 20 km are consistent with observation of polar stratospheric cloud formation in this range during the austral winter of 1993, and with observations showing increased ozone depletion above 20 km relative to previous years. (Auth. mod.)

I-53430

Martinerie, P., Brasseur, G.P., Granier, C., **Chemical composition of ancient atmospheres: a model study constrained by ice core data,** *Journal of geophysical research,* July 20, 1995, 100(D7), p.14,291-14,304, 77 refs.

A coupled chemistry radiation transport two-dimensional model of the lower and middle atmosphere was adapted to study the chemical composition of the atmosphere at preindustrial time and last glacial maximum (LGM). The model was constrained by trace gas concentrations (CO_2, CH_4, and H_2O) inferred from polar ice core records. The formulation of tropospheric dynamics and chemistry was improved in order to more accurately simulate the transport and the oxidation processes below the tropopause. The objectives are to infer the changes in middle-atmosphere temperature, ozone layer, and oxidation capacity of the atmosphere (e.g., methane lifetime) over the last 18,000 years. A middle-atmosphere cooling was obtained between LGM and preindustrial Holocene (PIH) as well as between PIH and present time, mainly due to changes in the CO_2 and chlorofluorocarbon (CFC) concentrations, respectively. Between LGM and PIH the compensating effects of CO_2 and N_2O lead to little variation in stratospheric ozone. The corresponding changes in the methane sink are too small to have played a dominant role in the past methane concentration changes. The model-derived methane emissions for LGM, PIH, and present time are in good agreement with methane sources evaluated during these three periods. (Auth. mod.)

I-53444

Ramachandran, T.V., Sathe, A.P., Joshi, P.V., Balani, M.C., **Summary of environmental study carried out by Bhabha Atomic Research Centre during 8th, 9th and 10th summer Indian expeditions to Antarctica,** *India. Atomic Energy Commission. Bhabha Atomic Research Centre. Technical report,* 1994, BARC-1994/E/003, 37p., DE95-608072, Refs. p.30-32.

The Bhabha Atomic Research Centre has participated in the 8th, 9th and 10th summer expeditions to Antarctica during the 1988-91 season to carry out background radiation surveys and to collect representative samples for radioactivity and heavy metal analyses. Spot measurements of ions as well as radon daughter radionuclides were also carried out during the expeditions. Radon levels as well as heavy metal pollutant concentrations have been found to be quite low in general; however higher levels were observed at places where human activity is concentrated around the landing area and the laboratory site. (Auth. mod.)

I-53445

Emmons, L.K., **Measurement and analysis of polar stratospheric ClO and N_2O by ground-based mm-wave spectroscopy,** Stony Brook, State University of New York, 1994, 139p., University Microfilms order 94-33182, Ph.D. thesis. Refs. p.130-139.

Analysis and interpretation of measured spectra of spring-time stratospheric ClO and N_2O made at McMurdo Station during Sep. and Oct. in 1992, and at Thule Air Base, Greenland, during Feb. and Mar. 1992 and 1993, using a ground-based mm-wave receiver, are presented. Measurements of ClO, a direct product of ozone destruction, were made through the evolution of the antarctic ozone hole. The emission spectrum of ClO at 278.632 GHz was observed and vertical profiles have been determined from measurements both inside and outside the polar vortex; a sharp difference is seen between them. Comparisons are made to coincident balloon and satellite measurements of ozone, and ground-based measurements of N_2O. The diurnal variation of the low altitude layer of ClO present in the antarctic ozone hole has also been measured. The mixing ratio increases after sunrise, from less than 0.1 ppbv just before sunrise to about 1.5 ppbv at midday, and decreases with increasing solar zenith angle after midday. This diurnal record is unique and is valuable for the validation of photochemical models of the polar stratosphere. N_2O is a good tracer of stratospheric dynamics, having only ground sources and a long chemical lifetime in the atmosphere. Correlations with coincident ozonesonde measurements show no indication of appreciable ozone depletion during this period. (Auth. mod.)

I-53453

Carslaw, K.S., Luo, B.P., Peter, T., **Analytic expression for the composition of aqueous HNO_3-H_2SO_4 stratospheric aerosols including gas phase removal of HNO_3,** *Geophysical research letters,* July 15, 1995, 22(14), p.1877-1880, 10 refs.

The recognition that stratospheric aerosols may remain liquid at polar winter temperatures leads to a need for reliable methods of estimating the aerosol composition, both for the interpretation of particle observations and for use within stratospheric chemical models. This paper presents an analytic expression for the composition of ternary aerosols and the gaseous HNO_3 concentration in terms of the temperature and total amounts of H_2SO_4, HNO_3 and H_2O, based upon the thermodynamic model of Carslaw et al. (1995). (Auth. mod.)

I-53454

Seckmeyer, G., et al, **Geographical differences in the UV measured by intercompared spectroradiometers,** *Geophysical research letters,* July 15, 1995, 22(14), p.1889-1892, 8 refs.

Five UV spectroradiometers representative of the types used in monitoring programs on several continents were intercompared at the Fraunhofer Institute for Atmospheric Environmental Research (IFU), Garmisch-Partenkirchen, Germany, during a campaign in Aug. 1994. Global spectral irradiances between 290 and 410 nm were measured over a range of solar zenith angles from 30° to 80°. Scans were synchronized to enable useful comparisons to be made under changing weather conditions, which included overcast, partly cloudy, and clear skies. No exchange of data was allowed between participating groups until after the campaign. At wavelengths longer than 310 nm, the spectra generally agreed to within ±5%. At wavelengths shorter than 310 nm, differences between instruments were larger, especially at larger solar zenith angles. Causes of differences are discussed. UV doses measured at sites in the Southern Hemisphere are systematically larger than those measured at the corresponding northern latitudes. During the summer months the daily doses at the South Pole exceed those at mid-latitudes in the Northern Hemisphere. (Auth. mod.)

I-53456

Ricaud, P.D., et al, **Polar stratospheric clouds as deduced from MLS and CLAES measurements,** *Geophysical research letters,* Aug. 1, 1995, 22(15), p.2033-2036, 18 refs.

From Aug. 30, 1992 to Sep. 3, 1992 a supersaturated area at 465 K potential temperature is deduced from Microwave Limb Sounder water vapor measurements over western Antarctica, where high extinction coefficients measured by spectrometry indicate polar stratospheric clouds (PSCs). These PSCs are attributed partly to the effect of an anticyclone located over South America and partly to localized orographic waves, which raise the isentropes and generate rapid adiabatic cooling. A local minimum in column O_3 is observed in this area, which is believed to be a consequence of the dynamics. Enhanced ClO abundances downstream of the region indicate PSC processing and chlorine activation. (Auth. mod.)

I-53470

Adolphs, U., Wendler, G., **Pilot study on the interactions between katabatic winds and polynyas at the Adélie Coast, eastern Antarctica,** *Antarctic science,* Sep. 1995, 7(3), p.307-314, Refs. p.313-314.

Infrared satellite images of the coastal area off Adélie Land were examined together with two wind data sets, one from the Dumont d'Urville Station, the other from an Automated Weather Station during the 1986 winter. A correlation between the development of open water areas (polynyas) and the appearance of extremely strong offshore winds can be drawn. The wind direction tended to be more perpendicular to the coastline during these extreme 'events', suggesting a katabatic origin of the increase in wind strength. In the study area the influence of the katabatic wind on the sea ice extends 20-100 km offshore. Sea ice motion further off the coast seems to be more dominated by synoptic-scale weather systems. Broader scale atmospheric influences may create large polynyas which influence the development of coastal winds, as the temperature contrast between open water and the cold continent generates its own circulation. Strong wind events can have a weakening effect on the coastal sea ice which can lead to a much more sensitive reaction of the sea ice in response to following anomalous wind events. (Auth.)

I-53472

Turner, J., Lachlan-Cope, T.A., Thomas, J.P., Colwell, S.R., **Synoptic origins of precipitation over the Antarctic Peninsula,** *Antarctic science,* Sep. 1995, 7(3), p.327-337, 16 refs.

The synoptic origins of precipitation on the western side of the Antarctic Peninsula over the one year period Mar. 1992 to Feb. 1993 are investigated using meteorological observations, satellite imagery and analyses produced by the UK Meteorological Office. Precipitation at Rothera Station was found to occur at 30% of the synoptic reporting time with 80% of precipitation reports being associated with cyclonic disturbances. Although three quarters of all precipitation reports were for snow, the proximity of Rothera to the zone of maximum cyclonic activity meant that incursions of mild air produced rain in all seasons. During the year 95% of all precipitation was classed as slight. Variability of precipitation on the intraseasonal timescale was highly dependent on the synoptic-scale circulation. The most common synoptic situation for precipitation was a frontal cyclone over the Bellingshausen Sea which accounted for 38% of all precipitation events and 62% of the moderate and heavy precipitation reports. Of the extra-tropical cyclones that gave precipitation 49% were found to have developed south of 60°S. (Auth. mod.)

I-53473

Bevilacqua, R.M., et al, **Polar Ozone and Aerosol Measurement experiment (POAM II),** *SPIE—The International Society for Optical Engineering. Proceedings,* 1994, Vol.2266, Optical Spectroscopic Techniques and Instrumentation for Atmospheric and Space Research, San Diego, California, 25-27 July, 1994. Edited by J.X. Wang and P.B. Hays, p.374-382.

DLC QC450.O67

The Polar Ozone and Aerosol Measurement experiment (POAM II) was launched on the SPOT 3 satellite on Sep. 25, 1993. POAM II is designed to measure the vertical profiles of the polar ozone, aerosols, water vapor, nitrogen dioxide, atmospheric density and temperature in the stratosphere and upper troposphere. It makes solar occultation measurements in nine channels defined by narrowband filters. The field of view is 0.01 by 1.2°, with an instantaneous vertical resolution of 0.6 km at the tangent point in the earth's atmosphere. The SPOT 3 satellite is in a 98.7° inclined sun-synchronous orbit at an altitude of 833 km. From the measured transmissions, it is possible to determine the density profiles of aerosols, O_3, H_2O, and NO_2. Using the assumption of uniformly mixed oxygen, one is also able to determine the temperature. The authors present details of the POAM II instrument design, including the optical configuration, electronics and measurement accuracy. They also present preliminary results from the occultation measurements made to date. (Auth.)

I-53479

Peckham, G.E., et al, **Atmospheric composition measurements by the Microwave Limb Sounder (MLS) on the Upper Atmosphere Research Satellite,** International Geoscience and Remote Sensing Symposium, Firenze (Florence), Italy, July 10-14, 1995. IGARSS'95. Quantitative remote sensing for science and applications. Vol.1, New York, Institute of Electrical and Electronics Engineers, 1995, p.429-431, 22 refs.

The Microwave Limb Sounder (MLS) has monitored the composition of the stratosphere and lower mesosphere for more than three years since its launch on the Upper Atmosphere Research Satellite in Sep. 1991. The MLS measures thermal emission from the atmospheric limb at millimeter wavelengths and is the first limb sounder to operate at these wavelengths from space. Major results to date are summarized. The depletion of ozone in the antarctic spring is illustrated with maps for 1991, '92 and '93. Maps for the Arctic are compared with corresponding maps for the Antarctic. A significant decrease in gaseous HNO_3 has been observed in the antarctic vortex. Water vapor fields used as tracers illustrate dynamical features of the winter polar vortices. (Auth. mod.)

I-53483

Miao, J.G., Markus, T., Burns, B.A., **Retrieval of temperature profiles over sea ice with multisensor analysis: combination of the DMSP's SSM/I, OLS, and SSM/T1 sensors,** International Geoscience and Remote Sensing Symposium, Firenze (Florence), Italy, July 10-14, 1995. IGARSS'95. Quantitative remote sensing for science and applications. Vol.2, New York, Institute of Electrical and Electronics Engineers, 1995, p.1142-1144, 6 refs.

In polar regions the surface conditions are complex, with mixtures of open water and different types of ice having different emissivities and coverage in the footprints of Special Sensor Microwave Temperature (SSM/T1.) In this paper the authors have combined SSM/T1 data with coincident data from the Special Sensor Microwave Imager (SSM/I) and the Operational Linescan System (OLS) to get surface information, specifically ice concentration and surface temperature, from which the emissivities of open water and two ice types at a frequency of 50.5 GHz are estimated. The temperature retrieval algorithm is based on the constrained linear inversion method. Temperature profiles are retrieved for the Weddell Sea region during July 1992, and compared to radiosonde data from the German research vessel *Polarstern.* The results show that multisensor retrieval on the average gives a 1°K (rms) improvement in the lower troposphere ($h<5$ km). (Auth. mod.)

I-53486

Chen, B., Bromwich, D.H., Hines, K.M., Pan, X.G., **Simulations of the 1979-88 polar climates by global climate models,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.83-90, 18 refs.

Simulation of the northern and southern polar climates for 1979-88 by 14 global climate models (GCMs), using the observed monthly averaged sea-surface temperatures and sea-ice extents as boundary conditions, is part of an international effort to determine the systematic errors of atmospheric models under realistic conditions, the so-called Atmospheric Model Intercomparison Project (AMIP). In this study, intercomparison of the models' simulation of polar climate is discussed in terms of selected surface and vertically integrated monthly averaged quantities, such as sea-level pressure, cloudiness, precipitable water, precipitation and evaporation/sublimation. The results suggest that the accuracy of model-simulated climate features in high latitudes primarily depends on the horizontal resolution and the treatment of physical processes in the GCMs. AMIP offers an unprecedented opportunity for the comprehensive evaluation and validation of current atmospheric models and provides valuable information for model improvement. (Auth.)

I-53487

Bromwich, D.H., Chen, B., Tzeng, R.Y., **Arctic and antarctic precipitation simulations produced by the NCAR community climate models,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.117-122, 15 refs.

Precipitation predictions from global-climate models (GCMs) for the ice-covered Arctic Ocean and the ice sheets of Antarctica are among the most important aspects of the inferred response of the polar areas to climate change. The present-day atmospheric-moisture budget poleward of 70 latitude in both hemispheres, as represented by two versions of the NCAR (U.S. National Center for Atmospheric Research) community climate model (CCM1 and CCM2), is compared with observational analyses. The quantities examined on the seasonal and annual time-scales are precipitation, evaporation/sublimation and atmospheric poleward moisture transport. The results are discussed in terms of the physiographic and climatic characteristics of both polar regions and of how the particular models handle moisture transport; CCM1 uses the positive-moisture fixer and CCM2 the semi-Lagrangian transport. A particularly important test both for models and for observations is the degree to which the independently determined moisture-budget quantities actually balance. Deficiencies of both observations and models are discussed. (Auth. mod.)

I-53492

Budd, W.F., Reid, P.A., Minty, L.J., **Antarctic moisture flux and net accumulation from global atmospheric analyses,** *Annals of glaciology,* 1995, Vol.21, International Symposium on the Role of the Cryosphere in Global Change, Columbus, OH, Aug. 7-12, 1994. Proceedings. Edited by D.A. Rothrock, p.149-156, 29 refs.

Previous attempts to derive the antarctic surface net accumulation distribution from atmospheric-moisture fluxes, in reasonable agreement with the observed distribution, have encountered many difficulties. The present analysis uses the Australian Bureau of Meteorology Global Atmospheric Assimilation and Prediction Scheme (GASP), which has been operational since 1989, to derive the net air-mass and moisture fluxes over the Antarctic. It is shown that the annual mean net surface accumulation closely resembles the glaciologically observed distribution and provides a physical basis for the observed pattern, through the moisture transports. The variations with latitude and elevation and through the annual cycle are also well reproduced. Although some mass-closure errors still exist, they are expected to become insignificant with the new generation of improved analysis schemes. Consequently, the atmospheric analyses can provide a sound basis for both assessing the performance of global climate models in simulating antarctic accumulation rates and monitoring long-term changes which may occur with global warming. (Auth.)

I-53504

Ito, T., **Nature and origin of antarctic submicron aerosols,** Ice core studies of global biogeochemical cycles. North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I, Vol.30. Edited by R.J. Delmas, Berlin, Springer-Verlag, 1995, p.23-38, 28 refs.

The phenomenological behavior of submicron aerosols in the antarctic atmosphere is summarized and discussed in relation with their significance in aerosol processes in Antarctica. It is inferred that two types of aerosols with different histories are important in the antarctic troposphere. The intrusion of maritime air during the cyclonic storms that occur mostly during cold months causes sea-salt particles and aged sulfate particles, originally contained in the clean maritime air, to dominate the aerosols; on the other hand, during warm months, aerosols in the chemical form of sulfuric acid are predominant. These sulfuric acid aerosols are formed by photochemical oxidation of sulfur-bearing gases in the sunlit troposphere over Antarctica, although the detailed process of the aerosol formation is still an open question. (Auth.)

I-53505

Saltzman, E.S., **Ocean/atmosphere cycling of dimethylsulfide,** Ice core studies of global biogeochemical cycles. North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I, Vol.30. Edited by R.J. Delmas, Berlin, Springer-Veriag, 1995, p.65-89, Refs. p.85-89.

Recent progress in the cycling of dimethylsulfide (DMS) through the ocean and atmosphere is reviewed, and the mechanisms by which climatic change may impact on the emissions, transformations, or deposition of oceanic sulfur are discussed. Several pertinent studies carried out in the Antarctic, such as the complete annual cycle of aerosol chemistry at Mawson Station, are cited.

I-53507

Peel, D.A., **Chemistry and climatic role of biogenic sulfur: group discussion,** Ice core studies of global biogeochemical cycles. North Atlantic Treaty Organization. Advanced Science Institutes. NATO ASI Series I, Vol.30. Edited by R.J. Delmas, Berlin, Springer-Verlag, 1995, p.167-173, 15 refs.

The discussion leads to the following conclusions: that the ocean-atmosphere sulfur cycle is highly sensitive to climate change on both sub-decadal and glacial-interglacial time-scales; that the nss-SO_4^{2-} deposition over coastal and central areas of Antarctica is primarily a result of oceanic sulfurous emissions, mainly of DMS; that there were much higher concentrations of MSA (methlysulphonic acid) in central Antarctica during the last glacial maximum and by contrast, seemingly lower concentrations over NE Greenland; that there is a much stronger seasonality of MSA near the coast in Antarctica, compared with inland; that the MSA/nss-SO_4^{2-} fraction is higher in coastal parts of Antarctica and also generally higher during climatically warm periods in Antarctica; and that MSA can migrate in ice cores, especially where it is relatively warm, and in these cases can disturb the preserved seasonal signal.

I-53553

Brezgin, N.I., et al, **Total ozone concentrations during the antarctic spring anomaly of 1989** [Nekotorye rezul'taty issledovaniia obshego soderzhaniia ozona v period vesenneĭ antarkticheskoĭ anomalii 1989 g.], *Moscow. Tsentral'naia aerologicheskaia observatoriia. Trudy,* 1992, Vol.179, p.3-11, In Russian with English summary. 5 refs.

Results of total ozone measurements at Molodezhnaya Station and during the 46th cruise of the research vessel *Akademic Shirshov* from Aug. to Nov. 1989 are presented. Baric contour maps and the cross-section of zonal and meridional components of wind above Molodezhnaya for the period of investigation are provided. (Auth.)

I-53554

Brezgin, N.I., Sazonov, V.V., Chizhov, A.F., **Mesospheric ozone investigations in south polar regions** [Nekotorye predvaritel'nye rezul'taty issledovaniia ozona v mezosfere iuzhnogo poliarnogo raĭona], *Moscow. Tsentral'naia aerologicheskaia observatoriia. Trudy,* 1992, Vol.179, p.34-44, In Russian with English summary. 15 refs.

Mesospheric ozone measurements, obtained by SFM-1 instruments aboard the satellite Meteor and rocketborne photometer at Molodezhnaya Station from 1985 to 1988, are analyzed. Considerable seasonal variations of ozone concentrations in the 55-80 km altitude range were found. These, and atmospheric temperature, were obtained by standard rocket measurements at Molodezhnaya Station.

I-53555

Poliakova, E.A., Chizhov, A.F., **CAO data on the dependence of ozone density and relative mixture on angle of maximum solar elevation** [Zavisimost' kontsentratsii i otnosheniia smesi ozona ot maksimal'noĭ vysoty solntsa po dannym raketnykh opticheskikh ozonometrov TAO], *Moscow. Tsentral'naia aerologicheskaia observatoriia. Trudy,* 1992, Vol.179, p.45-54, In Russian with English summary. 8 refs.

Analysis of ozone optical measurements, obtained in the 40-50 km altitude range above Molodezhnaya Station, is presented. The dependence of ozone density and relative mixture on the elevation of the sun at local noon is discussed.

I-53560

Brown, W.O.J., Fraser, G.J., Fukao, S., Yamamoto, M., **Spaced antenna and interferometric velocity measurements with MF and VHF radars,** *Radio science,* July/Aug. 1995, 30(4), p.1281-1292, 28 refs.

Spaced antenna and interferometry techniques are applied to data collected on two MF radars, at Christchurch, New Zealand, and at Scott Base, and one VHF radar, the MU radar at Shigaraki, Japan. Velocity results are compared as functions of characteristics such as the temporal scale and anisotropy of the scatter. In general, there was good agreement between the two techniques; however, when the temporal scale is small indicating turbulent scatter, there was less agreement. The interferometry technique did not appear to be influenced greatly by anisotropy in the scatter. However, it was affected by averaging of the Doppler spectra and by the use of an extra receiver. It is suggested that less averaging of the spectra results in increased random noise components in the spectra, which in the phase spectra are interpreted as scattering from a greater range of zenith angles. The use of three receivers rather than four also led to scattering that appeared to originate from a greater range of zenith angles. These effects led to lower interferometric velocity estimates that are more biased towards full correlation analysis (FCA) true velocities. (Auth. mod.)

I-53568

Tokioka, T., **Climate changes predicted by climate models for the increase of greenhouse gases,** *Progress in nuclear energy,* 1995, Vol.29 (Supplement), International Symposium on Global Environment and Nuclear Energy Systems, Susono Shizuoka, Japan, Oct. 24-27, 1994, edited by A. Shimizu, p.151-158, 11 refs.

Climate models have been used to predict climate changes caused by the increase of greenhouse gases. Models predict physical states of the upper part of the earth including the atmosphere, the ocean, the land surface and the cryosphere with the use of physical laws. When the atmospheric concentration of CO_2 is doubled, globally averaged surface temperature is predicted to increase 1.5 to 4.5°C. Temperature increase is most dominant in winter in high latitudes due mainly to sea ice-albedo and snow-albedo feedbacks. Geographically, it is dominant over continents in high latitudes. The hydrological cycle is activated; precipitation is divided into two types, i.e., precipitation from cumuliform clouds and that from stratiform clouds. The former (latter) type increases (decreases) in a globally averaged sense. Therefore the precipitating area decreases while the precipitation amount increases. In summer, many models predict a decrease in soil moisture in mid-latitudes. When atmospheric CO_2 concentration increases at the compound rate of 1% per year, the globally averaged surface temperature increase is about 60% of the equilibrium value, i.e., 0.9-2.7°C. The remaining 40% is for potential future increase. (Auth. mod.)

I-53573

Jones, P.D., Limbert, D.W.S., **Antarctic surface temperature and pressure data,** *Oak Ridge National Laboratory,* Sep. 1989, ORNL/CDIAC-27NDP-032, Carbon Dioxide Information Analysis Center. Environmental Sciences Division Publication No.3215, 29p. + appendix, Refs. passim.

This document presents monthly mean surface temperature and pressure data from 30 antarctic stations. These data were assembled primarily from *World Weather Records* volumes for 1951-1960 and 1961-1979 and from *Monthly Climatic Data for the World* records since 1961. The periods of record vary by station. The earliest data are from 1903, the most recent from 1988. Data were assessed for quality and for long-term homogeneity through the use of interstation comparison techniques. These data are available free of charge as a numeric data package (NDP) from the Carbon Dioxide Information Analysis Center. The NDP consists of this document and a magnetic tape containing machine-readable data files. This document provides tabular listings of the temperature and pressure data, describes how the data were processed, defines limitations and restrictions of the data, and provides reprints of pertinent literature. (Auth.)

I-53588

Savitskiĭ, G.B., **Development of hydrometeorological processes over Antarctica in 1985** [Osobennosti razvitiia gidrometeorologicheskikh protsessov nad Antarktikoĭ v 1985 g.], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1992, Vol.88, p.60-65, In Russian.

From hydrometeorological data, and surface and altitude charts on ice type and conditions, characteristics of atmospheric and ice processes in Antarctica were determined, and some of their general characteristics in 1985 are discussed. Monthly data are presented on atmospheric circulation, the main trajectory of cyclonic occurrences, and the average monthly distribution of drifting ice.

I-53589

Savitskiĭ, G.B., Grigor'ev, A.V., Sinitsyn, I.P., **Use of GRID information for hydrometeorological support operations in Antarctica** [Ispol'zovanie informatsii GRID dlia gidrometeorologicheskogo obespecheniia v Antarktike], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1992, Vol.88, p.66-67, In Russian. 2 refs.

After 475 analyses of surface and altitudinal (H-500) pressure field GRID code data, the information was effectively applied to three-day experimental weather forecasts at Molodezhnaya Station.

I-53620

Rabtsevich, S.V., **Verification and effectiveness of a method for long range meteorological forecasting in the fall for Antarctica** [Obespechennost' i effektivnost' metoda dolgosrochnykh meteorologicheskikh prognozov na osen' po Antarktike], *St. Petersburg. Arkticheskii i antarkticheskii nauchno-issledovatel'skiĭ institut. Trudy,* 1990, Vol.422, p.107-120, In Russian. 4 refs.

Verification of forecasting atmospheric circulation as well as determining pressure and temperature anomalies are presented. Verification was done on subordinate material from 1957 through 1979, and independent data from 1982 through 1984. Methodical verification of forecasts of pressure and temperature anomaly values throughout the Southern Hemisphere is equal on average, while the effectiveness of test forecasts are in agreement. Verification of forecasts of temperature anomaly values, with an error of ±2°, is near 80% while for pressure anomalies it is ±4-±5 GPa. (Auth. mod.)

I-53632

Manney, G.L., Zurek, R.W., Froidevaux, L., Waters, J.W., O'Neill, A., Swinbank, R., **Lagrangian transport calculations using UARS data. Part II: ozone,** *Journal of the atmospheric sciences,* Sep. 1, 1995, 52(17), p.3069-3081, 22 refs.

Trajectory calculations are used to examine ozone transport in the polar winter stratosphere during periods of the Upper Atmosphere Research Satellite (UARS) observations. The value of these calculations for determining mass transport was demonstrated previously using UARS observations of long-lived tracers. In the middle stratosphere, the overall ozone behavior observed by the Microwave Limb Sounder in the polar vortex is reproduced by this purely dynamical model. Calculations show the evolution of ozone in the lower stratosphere during early winter to be dominated by dynamics in Dec. 1992 in the Arctic. Calculations for June 1992 in the Antarctic show evidence of chemical ozone destruction and indicate that ca. 50% of the chemical destruction may be masked by dynamical effects, mainly diabatic descent, which bring higher ozone into the lower-stratospheric vortex. Estimating differences between calculated and observed fields suggests that dynamical changes masked ca. 20-35% of chemical ozone loss during late Feb. and early Mar. 1993 in the Arctic. (Auth. mod.)

I-53644

Pitari, G., Visconti, G., **Possible effects of CO_2 increase on the high-speed civil transport impact on ozone,** *Journal of geophysical research,* Aug. 20, 1995, 99(D8), p.16,879-16,896, 24 refs.

An attempt is made to model the effects of the carbon dioxide increase which is predicted in the future atmosphere when HSCT (high speed civil transport) should be operational. For this purpose a three-dimensional model is used first for the radiative and dynamical calculations followed by a photochemical two-dimensional model including an explicit gas-particle interaction in the process of aerosol formation. The denoxification and denitrification associated with the formation of nitric acid trihydrate (NAT) aerosols significantly affect the partition of chemical families. The radiative perturbation introduced by the CO_2 increase perturbs the stratospheric dynamics such that the lower stratospheric residual circulation is enhanced. This reduces by about 15% the stratospheric residence time of odd nitrogen injected by the aircraft, so that the overall perturbation of stratospheric chemistry due to HSCT is mitigated with respect to the reference case in which CO_2 is kept at the present level. Numerous graphs and several text passages refer to the high latitudes of the Southern Hemisphere. (Auth. mod.)

I-53651

Kirchhoff, V.W.J.H., et al, **Brazilian network of stratospheric ozone monitors: observations of the 1992 ozone hole,** *Revista brasileira de geofísica,* Dec. 1993, 11(2), p.205-213, With Portuguese summary. 13 refs.

A network of spectrophotometers for ground-based operation has recently been installed in Brazil and Chile to provide systematic total column ozone data. First results are described for some of these stations, including the 1992 observation of the antarctic stratospheric ozone hole at Punta Arenas, Chile, and at the Brazilian Antarctic Station Comandante Ferraz. (Auth.)

I-53652

Kane, R.P., **Total ozone trends in the Southern Hemisphere: an update,** *Revista brasileira de geofísica,* Dec. 1993, 11(2), p.223-231, With Portuguese summary. 20 refs.

In this note, the authors examine the total ozone variations at several latitudes in the Southern Hemisphere, including Showa Station. The largest variation of total ozone is seasonal, which at middle latitudes can be as large as 30% decrease from spring to autumn. The next important variation is the quasi-biennal oscillation which is irregular and can have a range of 0-10%. The long-term variation (decrease) is comparatively small, only about 2-3% from 1980 onwards up to 1987, after which a rising tendency is indicated, after allowing for data inaccuracies. As a health hazard, the seasonal variation would be most dangerous, specially from spring to summer, between 10 AM and 3 PM. (Auth. mod.)

I-53654

Zheng, X.D., Zhou, X.J., Lu, L.H., Guo, S., **Observational study of the 93 "Ozone Hole" at Zhongshan Station, Antarctica,** *Chinese science bulletin,* July 1995, 40(13), p.1106-1109, 4 refs.

Measurements of O_3, UV-B and NO_2 with a Brewer ozone-spectrophotometer were carried out at Zhongshan Station during the 9th CHINARE program (1992-93). The data of total column ozone abundance from the Brewer, compared with the TOVS data, and the dose rate of noontime biologically UV-B (290-325 nm) radiation at Zhongshan are presented in this note. An outline of the 1993 ozone hole and its impact on enhancing the penetration of UV-B radiation at Zhongshan is presented. (Auth. mod.)

I-53660

Saxena, V.K., Anderson, J., Lin, N.H., **Changes in antarctic stratospheric aerosol characteristics due to volcanic eruptions as monitored by the Stratospheric Aerosol and Gas Experiment II satellite,** *Journal of geophysical research,* Aug. 20, 1995, 100(D8), p.16,735-16,751, 54 refs.

The objectives of this study are (1) to use Stratospheric Aerosol and Gas Experiment II (SAGE II)-based extinction measurements to study and identify the Mount Pinatubo volcanic aerosol plume within and in the vicinity of the antarctic vortex and to investigate the associated implications of ozone depletion during the austral spring of 1991, and (2) to use the known characteristics of the volcanic aerosol as a tracer for investigating the south polar transport across the vortex edge and stratospheric-tropospheric exchange and to compute estimates of sedimentation velocities and deposition fluxes of the Pinatubo aerosol. Ground truth measurements in the form of analyzing precipitation samples and shallow snow pits collected from the Marr Ice Piedmont on Palmer Peninsula have begun and will continue through the austral spring of 1996. (Auth. mod.)

I-53662

Egger, J., **Antarctic slope winds and the polar stratospheric vortex,** *Journal of atmospheric and terrestrial physics,* July 1994, 56(9), p.1067-1072, 16 refs.

A wave mean-flow interaction model is used to investigate the coupling of the antarctic slope winds and the polar vortex in the lower stratosphere in winter. The model is restricted to the antarctic domain but synoptic waves of fixed frequency and zonal wavenumber can be prescribed at the northern boundary. They represent southward moving midlatitude perturbations. Cooling at the slope of the antarctic continent induces southeasterly flow near the surface which acts as a source of westerly angular momentum to the atmosphere. The momentum so generated must be transported out of the antarctic domain by these synoptic waves. It is found that the polar vortex is intense in the troposphere and lower stratosphere, and that the slope winds are weak when these waves are ineffective in transporting angular momentum. On the other hand, if the momentum transport is sufficiently strong, the polar vortex is relatively weak and the slope winds are vigorous. (Auth. mod.)

I-53677

Stearns, C.R., Young, J.T., **Antarctic Meteorological Research Center: 1992-1993,** *Antarctic journal of the United States,* 1993, 28(5), p.335-336, 1 ref.

The functions of the Antarctic Meteorological Research Center (AMRC) are the following: to collect, process, archive, and display all possible satellite and ground-based meteorological data at McMurdo Station for research applications; to collect all useful and available synoptic meteorology products from sources other than Antarctica, such as the synoptic outputs of the Australian Bureau of Meteorology and the University of Wisconsin; and to distribute the antarctic meteorological data to all interested parties over Internet in Man-computer Interactive Data Access System (McIDAS) format (at present). A figure shows the AMRC data flow for 1993. Some parts of the data flow are discussed.

I-53678

Holmes, R.E., Weidner, G.A., Stearns, C.R., **Antarctic weather forecasting: 1992-1993,** *Antarctic journal of the United States,* 1993, 28(5), p.337, 2 refs.

From Apr. 1992 through Jan. 1993, the University of Wisconsin provided weather forecasts for the cruises of the R/V *Nathaniel B. Palmer,* Palmer Station and the *Polar Star* cruise from Hobart, Tasmania to McMurdo Station. Weather information was also sent to the Naval Support Force, Antarctica (NSFA), in Christchurch, New Zealand. The forecasts were made using data from automatic weather stations, recent observations from ships and/or stations in Antarctica, computer model forecasts obtained from the National Meteorological Center, and satellite imagery displayed on the Man-computer Interactive Data Access System (McIDAS).

I-53679

Booth, C.R., Lucas, T.B., Morrow, J.H., **High-resolution ultraviolet spectral irradiance monitoring program in polar regions: six years (and growing) of data available to polar researchers in ozone and ultraviolet related studies,** *Antarctic journal of the United States,* 1993, 28(5), p.338-341, Refs. p. 340-341.

The Antarctic Ultraviolet Spectroradiometer Monitoring Network was established by the U.S. National Science Foundation (NSF) in 1988 in response to predictions of increased ultraviolet (UV) radiation in the polar regions. The network consists of several automated, high-resolution spectroradiometers placed in strategic locations in the Antarctic and the Arctic. Spectroradiometers were installed in four locations between Feb. and Nov. 1988, and a fifth instrument was installed at Barrow, AK, in Dec. 1990. A table lists the positions and the period of data referred to in this report for these sites. A figure presents the time course of erythermally weighted irradiance for six sites. The data for the Northern and Southern Hemisphere show the expected seasonal patterns. For this data set, Palmer Station shows the highest exposure, occurring when traces of ozone-depleted air persisted until nearly midsummer.

I-53681

Karol', I.L., Frol'kis, V.A., Kiselev, A.A., **Radiative-photochemical modeling of the annually averaged composition and temperature of the global atmosphere during the last glacial and interglacial periods,** *Journal of geophysical research,* Apr. 20, 1995, 100(D4), p.7291-7301, 41 refs.

In this model reconstruction, the changes in surface air temperature and tropospheric relative humidity are prescribed, and both dry adiabatic and moist adiabatic lapse rates are used together with several other external estimates of radiative and photochemical parameters for these periods. The considerable reduction of greenhouse gas content in the atmosphere of both glacial and interglacial periods, including about a 50% reduction of stratospheric moisture in the glacial, leads to the warming of the middle and upper stratosphere by about 11 K and 4 K, in the glacial and interglacial periods, respectively. Stratospheric composition is found to be little sensitive to possible large variations of CO and NO_x surface sources. The ozone mixing ratio drops to 10-12 ppbv in the lower troposphere and increases to a maximum 6.0-7.5 ppmv in the 40 to 46 km layer, but remains almost the same as in preindustrial and in 1985 periods in the 20 to 30 km layer. This results in the approximate conservation of total ozone for all four periods considered. (Auth. mod.)

I-53682

Mote, P.W., **Annual cycle of stratospheric water vapor in a general circulation model,** *Journal of geophysical research,* Apr. 20, 1995, 100(D4), p.7363-7379, 57 refs.

The National Center for Atmospheric Research has redesigned its GCM, the Community Climate Model (CCM2), to enable studies of the chemistry and transport of tracers including water vapor. In this study, methane is carried as a tracer and converted to water; this simple chemistry provides an adequate representation of the upper stratospheric water vapor source. The cold temperature bias in the winter polar stratosphere, which the CCM2 shares with other GCMs, produces excessive dehydration in the Southern Hemisphere, but this dry bias can be ameliorated by setting a minimum vapor pressure. The CCM2's water vapor distribution and seasonality compare favorably with observations in many respects, though seasonal variations including the upper stratospheric semiannual oscillation are generally too small. Southern polar dehydration affects mid-latitude water vapor mixing ratios by a few tenths of a part per million, mostly after the demise of the vortex. (Auth. mod.)

I-53683

Rind, D., Lonergan, P., **Modeled impacts of stratospheric ozone and water vapor perturbations with implications for high-speed civil transport aircraft,** *Journal of geophysical research,* Apr. 20, 1995, 100(D4), p.7381-7396, 21 refs.

Ozone and water vapor perturbations are explored in a series of experiments with the Goddard Institute for Space Studies climate/middle atmosphere model. In the model calculations, varying amounts of ozone and water vapor are manipulated through several regions of the troposphere and stratosphere, including both polar latitudes. The effects of these manipulations are pointed out and described. Overall, the experiments emphasize that stratospheric changes affect tropospheric dynamics in the model; that tropospheric changes can affect stratospheric dynamics, and that tropospheric feedback processes and natural variability are important when assessing the climatic response to aircraft emissions. (Auth. mod.)

I-53691

Zhang, R.Y., Leu, M.T., Keyser, L.F., **Sulfuric acid monohydrate: formation and heterogeneous chemistry in the stratosphere,** *Journal of geophysical research,* Sep. 20, 1995, 100(D9), p.18,845-18,854, 43 refs.

This study investigates some thermodynamic properties (i.e., freezing/melting points) and heterogeneous chemistry of sulfuric acid monohydrate (SAM, $H_2SO_4 \cdot H_2O$), using a fast flow reactor coupled to a quadrupole mass spectrometer. The freezing point observations of thin liquid sulfuric acid films show that for acid contents between 75 and 85 wt % the monohydrate crystallizes readily at temperatures between 220 and 240 K on a glass substrate. For a constant H_2O partial pressure, lowering the temperature causes SAM to melt when the temperature and water partial pressure conditions are out of its stability regime. The reaction probability measurements indicate that the hydrolysis of N_2O_5 is significantly suppressed owing to the formation of crystalline SAM: the reaction probability on water-rich SAM (with higher relative humidity, or RH) is of the order of 10^{-3} at 210 K and decreases by more than an order of magnitude for the acid-rich form (with lower RH). These reported values on crystalline SAM are much smaller than those on liquid solutions. No enhancement of these reactions is observed in the presence of HCl vapor at the stratospheric concentrations. (Auth. mod.)

I-53692

Ciais, P., White, J.W.C., Jouzel, J., Petit, J.R., **Origin of present-day antarctic precipitation from surface snow deuterium excess data,** *Journal of geophysical research,* Sep. 20, 1995, 100(D9), p.18,917-18,927, 40 refs.

The deuterium excess (*d*) is defined as a linear combination of the D/H and $^{18}O/^{16}O$ ratios in natural waters. This paper presents an interpretation of deuterium excess data in surface antarctic snow, using an isotopic model to derive information on the origin of present-day antarctic precipitation. The data come from near the coast (D47, Adélie Land) and from inland (South Pole, 1000 km from the sea). The one-dimensional isotopic model belongs to the Rayleigh family but fully accounts for mixed cloud processes between 0°C and -30°C. Modeling *d* in polar snowfalls meets the problem of a large sensitivity to the saturation conditions prevailing at snow formation. Both inland and near the coast, the model can simulate the observed phase between *d* and δ in snow and moisture of subtropical origin (40°-20°S). Results support a distant vapor source for large-scale precipitation delivered to the antarctic continent. (Auth. mod.)

I-53715

Lou, G.P., **Three-dimensional simulation of nitrous oxide transport and antarctic vortex evolution,** Atlanta, Georgia Institute of Technology, 1994, 123p., University Microfilms order No.DA95-17133, Ph.D. thesis. 49 refs.

This study focuses on three areas: the structure of the stratospheric antarctic vortex and its evolution; the transport of N_2O and dynamical forces that dominate these processes; and the climatology of the N_2O mixing ratio distribution and its driving factors. A 3-dimensional spectra chemical transport model was employed to simulate N_2O processes. The dynamical driving fields are from the UKMO 4-dimensional assimilated data set. UARS CLAES N_2O mixing ratios are used for the N_2O initial conditions. Model results show that the N_2O distribution and transport closely resemble the CLAES measurements. Diagnostic study and model simulation results reveal that large-scale Eulerian mean vertical motion fields are upward inside the vortex and the mean residual circulation vertical velocity is downward. (Auth. mod.)

I-53720

Stefanutti, L., Morandi, M., Del Guasta, M., Godin, S., David, C., **Unusual PSCs observed by lidar in Antarctica,** *Geophysical research letters,* Sep. 1, 1995, 22(17), p.2377-2380, 14 refs.

Polar stratospheric cloud (PSC) measurements by ground-based lidar were carried out at Dumont d'Urville during the years 1989 to 1993. From such measurements it can be seen that there are cases of PSCs that are not consistent with the simplest nitric acid trihydrate (NAT) theories. Several cases of long-lasting, non-depolarizing PSCs were detected at temperatures below or close to the NAT freezing threshold, at about 195°K, suggesting the presence of durable supercooled droplets. PSC cases showing depolarizing (frozen) particles well above the NAT expected threshold are also shown. These results seem to be more consistent with recent laboratory and *in situ* findings, suggesting a close link between sulfate and PSC particles through the HNO_3-H_2O-H_2SO_4 ternary system. Depolarizing "warm" PSCs are also consistent with the laboratory-observed high melting point of the frozen sulfate core, which remains after NAT evaporation. (Auth. mod.)

I-53721

Vömel, H., Hofmann, D.J., Oltmans, S.J., Harris, J.M., **Evidence for midwinter chemical ozone destruction over Antarctica,** *Geophysical research letters,* Sep. 1, 1995, 22(17), p.2381-2384, 8 refs.

Two ozone profiles obtained over McMurdo Station showed a strong depletion in stratospheric ozone, and a simultaneous profile of water vapor showed the first clear signs of dehydration. The observation of polar stratospheric clouds (PSCs) beginning with the first sounding showing ozone depletion, the indication of rehydration layers which could be a sign for recent dehydration, and trajectory calculations all indicate that the observed low ozone was not the result of transport from lower latitudes. During this time the vortex was strongly distorted, transporting PSC-processed air well into sunlit latitudes where photochemical ozone destruction may have occurred. The correlation of ozone depletion and dehydration indicates that water ice PSCs provided the dominant surface for chlorine activation. An analysis of the time when the observed air masses could have formed type II PSCs for the first time limits the time scale for the observed ozone destruction to about 4 days. (Auth. mod.)

I-53724

Yiou, P., Jouzel, J., Johnsen, S., Rögnvaldsson, Ö.E., **Rapid oscillations in Vostok and GRIP ice cores,** *Geophysical research letters,* Aug. 15, 1995, 22(16), p.2179-2182, 32 refs.

This paper investigates the spectral properties of climatic time series derived from two recent ice cores in Greenland and East Antarctica. The signals behave in a similar way in the high frequency part of their spectra. The rapid oscillations found in the GRIP ice core were closely correlated to Heinrich Events. A comparable spectral feature is detected in the Vostok ice core. The possibilities of connections between the two hemispheres and proper ice sheet oscillations in the light of simple oscillating climate models are discussed. (Auth. mod.)

I-53806

Monastersky, R., **Ozone hole reemerges above the Antarctic,** *Science news,* Oct. 14, 1995, 148(16), p.245-246.

It is briefly reported that the ozone hole has once again eaten its way across the antarctic sky, reaching near-record proportions. Some findings on ozone loss this year by researchers from the University of Wyoming are cited.

I-53816

Venkatachari, R., Hanjura, A.K., Singh, D., **Interesting features of infrasonic pressure variations at Maitri, Antarctica,** *Indian journal of radio & space physics,* Apr. 1994, 23(2), p.125-129, 6 refs.

DLC QC801.I42

In this paper are reported general features of infrasonics that were observed in Antarctica with special emphasis on wave motions observed there, especially in the month of Oct. 1991. These may bear indirect evidence of temperature changes in the stratosphere. (Auth.)

I-53826

Murayama, S., et al, **Concentration variations of atmospheric CO_2 over Syowa Station, Antarctica and their interpretation,** *Tellus,* Sep. 1995, 47B(4), p.375-390, 42 refs.

Aircraft and ground-based measurements of the atmospheric CO_2 concentration have been made at Showa Station since Jan. 1983. The minimum concentration of the average seasonal CO_2 cycle occurs in March throughout the troposphere, while the maximum concentration appears in mid-August in the upper troposphere and in late September in the lower and middle troposphere. The peak-to-peak amplitude of the cycle decreases slightly with height. The CO_2 concentration increases with height during most of the year, but from late winter to spring this height dependency is minimal. To examine the contribution of the atmospheric transport processes to these variations in CO_2 concentration, a 3-dimensional trajectory analysis was performed using data from the U.S. National Meteorological Center. From the results obtained, it is postulated that northern hemispheric air with relatively high CO_2 concentration is transported to the antarctic region through the upper troposphere from late fall to winter, while air with low CO_2 concentration is transported from the Southern Hemisphere middle latitudes into the antarctic region through the lower troposphere in the remaining seasons. (Auth.)

I-53835

Osada, K., **Recent progress in Vostok ice core analysis: paleoclimate and paleoenvironment,** *Seppyo,* Mar. 1995, 57(1), p.57-59, In Japanese. 15 refs.

Selected reports through 1994 on the Vostok ice core are briefly reviewed. Fifteen references are cited of which two are in Japanese and 13 are in English. The ice core records of Vostok and Greenland indicate that during the last glaciation, when there were warming periods of over 2000 years in Greenland, there were corresponding warming periods in Antarctica. It is suggested that comparative analyses of Vostok, Greenland, and ocean drilling cores may provide a model for the relationship between Antarctica and global climate change in the future.

I-53868

Figge, R.A., White, J.W.C., **High-resolution Holocene and late glacial atmospheric CO_2 record: variability tied to changes in thermohaline circulation,** *Global biogeochemical cycles,* Sep. 1995, 9(3), p.391-403, 53 refs.

Results are presented from a new method for detecting changes in atmospheric CO_2 based on $\delta^{13}C$ analyses of selected peat components from a peat core in southern South America. The paleo-CO_2 record has decadal resolution spanning the last 14,000 radiocarbon years and compares well with antarctic ice core CO_2 data. Sharp peaks in CO_2 are detected during the late glacial, specifically at 10,200, 11,600 and 12,900 years BP. When compared to two deep-sea records interpreted to reflect changes in thermohaline circulation, these CO_2 pulses appear to relate to degassing events of the ocean associated with reinitiation of the thermohaline circulation occurring at this time. Two broad Holocene CO_2 excursions are also identified with peaks at 4,200 and 7,700 years BP. The driving mechanisms behind these excursions appear to be different from those in the late glacial. (Auth. mod.)

I-53910

Peng, G.B., Li, Q., Qian, B.D., **Climate and ice-snow cover** [Qihou yu bingxue fugai], Beijing, Qixiang chubanshe (Meteorology Press), 1992, 349p., In Chinese with English table of contents. Numerous refs. passim.

DLC QC926.32.P46 1992 Orien China

A general discussion is presented of the effects of sea ice, ice sheets, and snow on climate and of climate on ice and snow covers, mainly global, but with particular examples pertinent to the Antarctic, Arctic, and China and the relationship between them. The book is divided into six chapters: the global distribution of ice and snow covers; the effect of ice and snow covers on atmospheric circulation; the effect of atmospheric circulation on ice and snow covers; numerical modeling of ice-atmosphere processes; general circulation models; and ice and snow covers in weather forecasting. There is an English table of contents and each chapter contains numerous references in English, Chinese, and Russian.

I-53912

Austin, J., Hofmann, D.J., Butchart, N., Oltmans, S.J., **Mid stratospheric ozone minima in polar regions,** *Geophysical research letters,* Sep. 15, 1995, 22(18), p.2489-2492, 11 refs.

Recent springtime measurements of ozone vertical profiles in polar regions have revealed local ozone depressions of about 25% at altitudes near 30 km. Similar features are also identified in three-dimensional photochemical model results. The modeled ozone depressions are local and temporary, often associated with stratospheric warming events which transport air from low latitudes, altering its photochemical history. The feature may be a component of the climatology of the region, but occurs less frequently in the model, possibly because of the long-standing problem of the underprediction of upper stratospheric ozone. Both arctic and antarctic data are presented. (Auth. mod.)

I-53913

Hofmann, D.J., Oltmans, S.J., Johnson, B.J., Lathrop, J.A., Harris, J.M., Vömel, H., **Recovery of ozone in the lower stratosphere at the South Pole during the spring of 1994,** *Geophysical research letters,* Sep. 15, 1995, 22(18), p.2493-2496, 15 refs.

During 1994, springtime antarctic ozone measured at the south pole did not reach the record lows recorded during the 1993 ozone hole period when a value of 91±5 DU was observed. A low of 102 DU was recorded on Oct. 5, 1994, but such values were not sustained as in 1993. The recovery of total ozone in 1994 was mainly the result of moderation of ozone destruction in the 10-14 km region, probably related to diminishing stratospheric aerosol from the Pinatubo eruption, and may have also been related to disturbance of the vortex earlier than normal. As in 1993, ozone profiles at the minimum showed nearly complete destruction of ozone between 15 and 20 km in 1994. In this region, the rate of decline of ozone in September was as fast or somewhat faster than in 1992 and 1993 indicating continuing saturation of the ozone destroying chemistry, which is expected as stratospheric chlorine amounts continue to rise. As in 1993, ozone was again observed to be reduced in the 22-24 km region, suggesting that the ozone hole has now probably extended to a region unaffected prior to 1992. (Auth. mod.)

I-53914

Richwine, L.J., Clapp, M.L., Miller, R.E., Worsnop, D.R., **Complex refractive indices in the infrared of nitric acid trihydrate aerosols,** *Geophysical research letters,* Oct. 1, 1995, 22(19), p.2625-2628, 21 refs.

In experiments which simulate chemical reactions within polar stratospheric clouds, the refractive indices of nitric acid trihydrate (NAT) have been determined from the infrared spectra of laboratory generated aerosols. The aerosols are formed through homogeneous nucleation in a flow cell with separate regions for nucleation and observation, allowing for independent control of the temperature conditions in these regions. A spectrum of small, non-scattering particles is recorded to determine the frequency-dependent imaginary refractive index, within a scaling factor. A subtractive Kramers-Kronig routine is then used to calculate the real index. The scaling factor for the imaginary indices is determined by fitting a spectrum associated with larger, scattering particles, which depends on both the real and imaginary portions of the refractive indices. The complex refractive indices of NAT are reported over the range 700/cm to 4000/cm. (Auth. mod.)

I-53939

Kane, R.P., **Effect of antarctic ozone holes of 1988, 1989, and 1990 on lower latitudes of the Southern Hemisphere,** *Annales geophysicae,* June 1995, 13(6), p.656-659, 10 refs.

The October depletions in the antarctic ozone spread to lower latitudes in early Nov. in 1988, in late Nov. in 1989, and in late Oct. in 1990. The depletions were 10-15% for latitudes up to 40°S and smaller thereafter, and almost negligible at 25°S and beyond. However, for the Southern Hemisphere, the normal seasonal changes at middle latitudes from Oct. to Dec. are much larger (about 20%). Also, there are superposed fluctuations of about 20% over a few (5-6) days. (Auth.)

I-53948

Wang, Y.J., **Variation of atmospheric ozone and NO_2 at Zhongshan Station, antarctic spring,** *Antarctic research (Chinese edition),* June 1995, 7(2), p.45-50, In Chinese with English summary. 13 refs.

Using visible/UV differential absorption spectroscopy, the author observed atmospheric ozone and NO_2 contents at Zhongshan Station during the antarctic ozone hole in 1991. The results show that the ozone depletion occurs rapidly during the middle of Aug. and reaches a minimum value on Oct. 3, and after 4 days the ozone content quickly returns to normal values. The variations of atmospheric ozone and NO_2 content have a good positive correlation of up to 0.69. During the ozone hole, the content of NO_2 is always on a low level and the altitude of its layer is higher. It shows that the ozone depletion was not due to the catalytic loss process of odd nitrogen at Zhongshan Station. (Auth.)

I-53959

Jonsson, S., **Synoptic forcing of wind and temperature in a large cirque 300 km from the coast of East Antarctica,** *Antarctic science,* Dec. 1995, 7(4), p.409-420, 35 refs.

Between Jan. 18, 1988 and June 3, 1989, an automatic weather station recorded 13 different weather parameters every 3 h on a blue-ice area located in central Heimefront Range, 300 km from the Weddell Sea coast. The first part of this paper reports on annual and monthly data regarding air temperature, air pressure, wind speed and wind direction, and a comparison is also made with corresponding data from Neumayer and Halley stations. The second part deals mainly with winter conditions in the region. They seem, at least during 1988-89, to have been characterized by a large-scale (30-40 days) and, superimposed on the large-scale, a small-scale (3-4 days) covariation of air temperature, air pressure and wind speed. The large-scale variation was earlier found to be synoptically forced. This paper shows that synoptic forcing exists also on smaller time scales. (Auth. mod.)

I-53960

Yagüe, C., Redondo, J.M., **Case study of turbulent parameters during the antarctic winter,** *Antarctic science,* Dec. 1995, 7(4), p.421-433, 25 refs.

Two days of the antarctic winter (June 20-21, 1986) were chosen to study some turbulent parameters in this particular boundary-layer. Richardson number, Monin-Obukhov length, eddy transfer coefficients, turbulent kinetic energy, turbulent intensities, friction velocities and sensible heat flux at three levels (5, 17 and 32 m) were considered. The results show how the stability at 17 and 32 m influences the turbulent transfer at 5 m. Wind shear is the main mechanism to produce mixing in the lower atmosphere in Antarctica; thermal inversions associated with surface cooling develop with winds <10/s at 5 m. The possible influence of internal gravity waves on the atmospheric boundary-layer during strong stable stratification is studied. (Auth.)

I-53995

Frederick, J.E., **Ultraviolet sunlight reaching the Earth's surface: a review of recent research,** *Photochemistry and photobiology,* 1993, 57(1), p.175-178, 29 refs.

DLC QD601.A1P48

This paper summarizes current knowledge of ultraviolet (UV) solar radiation reaching the earth's surface with emphasis on results obtained since the last yearly review. The implications of large UV-B irradiances for the antarctic ecosystem are discussed. Although substantial enhancements over the normal background radiation levels have occurred, the absolute irradiances have not exceeded those typical of an unperturbed summer at middle latitudes. Available data indicate a measurable inhibition of photosynthesis in antarctic phytoplankton during periods of large ozone depletion in 1990. It is concluded that much more work needs to be done before definitive statements can be made concerning biological and ecological effects of current UV-B radiation levels over Antarctica. (Auth. mod.)

I-53996

Genthon, C., Braun, A., **ECMWF analyses and predictions of the surface climate of Greenland and Antarctica,** *Journal of climate,* Oct. 1995, 8(10), p.2324-2332, 18 refs.

A global reanalysis of recent climate is being carried out at the European Centre for Medium-Range Weather Forecasts (ECMWF). At the surface of the polar ice sheets (the atmospheric boundary condition for ice evolution), observations of climate are particularly scarce. To estimate how the new ECMWF climatology might help provide climate data over the polar ice sheets, the authors present 6 years of previously analyzed surface temperature and predicted precipitation for both Greenland and Antarctica. Analyses are the result of 6-h forecasts corrected to fit with reports from weather stations. In spite of a sparse coverage of the observation network, the analyzed temperature, including seasonality, is very reasonable. Interannual variability, however, appears greater than suggested by satellite observation. Mean annual precipitation in Antarctica is fairly well represented, but it is difficult to determine whether a lack of seasonality on the plateau is reasonable or not. Precipitation in coastal Greenland is often too high, and accumulation might be low inland. Mean predicted accumulations, 1594×10^{12} and 539×10^{12} kg/yr, over the Antarctic and Greenland ice sheets, respectively, are in good agreement with previous estimates. It is reasonable to expect that the reanalysis will largely satisfy the need for a full-coverage gridded climatology of the two polar ice sheets. (Auth. mod.)

I-53997

Crewell, S., Cheng, D.J., De Zafra, R.L., Trimble, C., **Millimeter wave spectroscopic measurements over the South Pole. 1. A study of stratospheric dynamics using N_2O observations,** *Journal of geophysical research,* Oct. 20, 1995, 100(D10), p.20,839-20,844, 23 refs.

Millimeter wave measurements of N_2O and O_3 were made nearly continuously from Feb. 1993 through early Jan. 1994 at the Amundsen-Scott Station. In order to separate chemical and dynamical effects, this paper uses the observations of the long-lived tracer N_2O to study stratospheric dynamics. The main emphasis is on the synoptic evolution of the polar vortex over an entire winter period, and quantitative results are given for various times and altitudes. Diabatic descent rates derived for different altitude levels showed the strongest descent in austral fall at high altitudes, agreeing fairly well with other model predictions. Subsidence was observed to continue until late Oct., well after polar sunrise. The breakdown of the vortex occurred first in the upper stratosphere, marked by the intrusion of N_2O-rich air at these altitudes, consistent with trajectory calculations. Calculated descent rates are not consistent with the idea that the polar vortex is a "flowing processor", rather it should be viewed as an isolated system. (Auth. mod.)

I-53998

Eluszkiewicz, J., Plum, R.A., Nakamura, N., **Dynamics of wintertime stratospheric transport in the Geophysical Fluid Dynamics Laboratory SKYHI general circulation model,** *Journal of geophysical research,* Oct. 20, 1995, 100(D10), p.20,883-20,900, 36 refs.

The kinematics of air motion in and around the polar vortices in the Geophysical Fluid Dynamics Laboratory SKYHI general circulation model are investigated by means of a Lagrangian particle analysis. Particles initialized in the mesosphere and upper stratosphere rapidly descend to the middle stratosphere. The dynamics of polar descent are investigated by diagnosing the forcing of the residual circulation. In the upper stratosphere, diabatic descent inside polar vortices is driven by Eliassen-Palm flux divergences associated with motions of period shorter than 2 days (presumably gravity waves) in the Antarctic, but of period greater than 3 days (presumably planetary waves) in the Arctic. In the lower stratosphere, long period processes, mainly from the 10 to 1 hPa region, produce descent near the vortex edge in both hemispheres. (Auth. mod.)

I-53999

Iraci, L.T., Middlebrook, A.M., Tolbert, M.A., **Laboratory studies of the formation of polar stratospheric clouds: nitric acid condensation on thin sulfuric acid films,** *Journal of geophysical research,* Oct. 20, 1995, 100(D10), p.20,969-20,977, 38 refs.

In a laboratory simulation of polar stratospheric cloud formation, thin sulfuric acid films were exposed to HNO_3 and H_2O and cooled to temperatures near the ice frost point. Fourier transform infrared (FTIR) spectroscopy was used to probe the condensed-phase species during isothermal experiments, and gas pressures were monitored with mass spectrometry. Supercooled liquid sulfuric acid films exposed to HNO_3 showed indications of HNO_3 uptake to form ternary solutions, followed by crystallization of nitric acid trihydrate (NAT). These film studies suggest that crystalline polar stratospheric cloud (PSC) growth is most easily accomplished when stratospheric sulfate aerosols (SSAs) remain liquid, absorb HNO_3, and produce crystalline nitric acid trihydrate via heterogeneous nucleation. If SSAs crystallize to SAT at some point during the winter, nitric acid condensation is hindered, and PSC formation could become more difficult. (Auth. mod.)

I-54000

Ricchiazzi, P., Gautier, C., Lubin, D., **Cloud scattering optical depth and local surface albedo in the Antarctic: simultaneous retrieval using ground-based radiometry,** *Journal of geophysical research,* Oct. 20, 1995, 100(D10), p.21,091-21,104, 36 refs.

Solar irradiance measurements from a ground-based multichannel radiometer system deployed at Palmer Station during spring 1991 are used to simultaneously estimate cloud scattering optical depth and surface albedo. Irradiance measurements at 410 and 630 nm, in conjunction with a discrete ordinate radiative transfer (RT) model, enable this simultaneous retrieval by exploiting the wavelength dependence in Rayleigh scattering strength. The RT model is used in an inverse mode to find the values of surface albedo and cloud optical depth that match calculated and measured irradiances at both wavelengths. Under the homogeneous stratiform cloud cover for which the technique applies, surface albedo at 630 nm was consistently retrieved at above 0.9. For most homogeneous overcast conditions, cloud optical depth (at 630 nm) is found to be in the range of 20-50, with a most probable value of 25. (Auth. mod.)

I-54011

Hanson, D.R., **Reactivity of $ClONO_2$ on $H_2{}^{18}O$ ice and organic liquids,** *Journal of physical chemistry,* Aug. 31, 1995, 99(35), p.13,059-13,061, 21 refs.

In experimental simulation of polar stratospheric cloud dynamics, the reactive uptake of $ClONO_2$ onto ^{18}O-labeled ice and onto organic liquids was measured in a cylindrical flow tube reactor using chemical ionization detection. The hydrolysis of $ClONO_2$ on $H_2{}^{18}O$ ice produced primarily $H^{18}OCl$, indicating that the $Cl-ONO_2$ bond is broken upon hydrolysis on ice. The loss of $ClONO_2$ onto liquid organic surfaces (ethylene glycol, cyclohexanone, decanol, and tridecane) was found to be efficient (reaction probability >0.06), and the product HNO_3 was detected in the gas phase. This suggests that dissociation or ionization are not prerequisites for heterogeneous reactions of $ClONO_2$. (Auth. mod.)

I-54012

Stamnes, K.H., Slusser, J., Bowen, M., **Derivation of total ozone abundance and cloud effects from spectral irradiance measurements,** *Applied optics,* Oct. 20, 1991, 30(30), p.4418-4426, 25 refs.

The authors describe a method to infer total ozone abundance and effective cloud transmission from global (diffuse plus direct) spectral irradiance measurements taken at the Earth's surface. The derivation of total ozone abundance relies on the comparison of measured irradiance ratios at two wavelengths in the UV part of the spectrum with a synthetic chart of this ratio computed for a variety of ozone abundances. The method presented here was applied for determining ozone abundance and cloud attenuation from the global irradiance measurements taken at McMurdo Station during the 1988-89 season. (Auth. mod.)

I-54035

Dirección Meteorológica de Chile. Centro Meteorológico Antártico. Programa de Estudios e Investigación, **Workshop "Meteorological activities in King George Island", 5-6 Jan. 1995,** Santiago de Chile, 1995, 16p. + 2 appends.

To improve international cooperation among countries with meteorological stations on King George I., the Chilean Antarctic Meteorological Center "Presidente Eduardo Freí Montalva" organized the first in-situ workshop attended by representatives from Brazil, Chile, China, Korea, Poland, Uruguay and Russia. This document presents summaries of the participants' brief reports on their individual meteorological activities on the island, the principal agreements among nations toward developing and implementing a meteorological data base on King George I. with free access to all users, and the relevant recommendations.

See also:
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J. OCEANOGRAPHY

J-51654
Guretskiĭ, V.V., Danilov, A.I., Shtammer, D., **Movements of Antarctic Circumpolar Current eddies at the eastern boundary of the Weddell Gyre according to satellite altimetry data** [Dvizhenie vikhrevykh obrazovaniĭ antarkticheskogo tsirkumpoliarnogo techeniia na vostochnoĭ granitse krugovorota Ueddella po dannym sputnikovoĭ al'timetrii], *Akademiia nauk. Doklady,* May-June 1992, 324(1), p.191-195, In Russian. 10 refs.

The obtained data allow a more thorough understanding and assessment of the effect of the active eddy formation zone in the Antarctic Circumpolar Current on the distribution of drifting ice south of the area. One can propose an analogous eddy regime in similar regions of the circumpolar current (Kerguelen Plateau, south of New Zealand, and in the Pacific Ocean sector east of the Udintsev fracture zone). (Auth mod.)

J-51655
Kavun, M.M., Vinnikovskaia, O.S., **New geophysical data on little known parts of the South Orkney trough and the Central Scotia basin** [Novye geofizicheskie dannye po maloizuchennym chastiam IUzhno-Orkneĭskogo troga i tsentral'nogo basseĭna moria Skosha], *Akademiia nauk. Doklady,* Oct. 1992, 326(5), p.860-864, In Russian. 8 refs.

Brief results from geophysical studies carried out in 1990 by the research vessel *Geolog Dmitriĭ Nalivkin* are presented. The material shows that the prevailing discussion on the origin of the South Orkney trough as a transformed fault probably needs correction. There is still insufficient data to identify the subduction zone of the earth's crust. Ocean depths within the boundaries of the trough are less than the average values for the deep bottom trough, and manifestations of volcanism in the South Orkney islands have not been revealed. (Auth. mod.)

J-51695
Fahrbach, E., Augstein, E., Olbers, D., **Impact of shelf and sea ice on water mass modifications and large-scale oceanic circulation in the Weddell Sea,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.167-187, 54 refs.

DLC G845.5.A54 1994

Following a review of the water masses and circulation in the global ocean, the focus shifts to some of the unique physical conditions of Weddell Sea waters. This portion of the review includes accounts of what is known of the Weddell Sea water mass modifications and the mechanics of the Weddell Gyre. Comparisons between observations and numerical models of these waters are discussed. There are also displayed contrasting illustrations showing stream function of the total mass transport in the South Atlantic Ocean and the southern Indian Ocean. Additional figures show the mean annual freezing and melting rates with a coupled ice-ocean-atmosphere model in the Weddell Sea. A final figure shows a two-dimensional model of the circulation under the Filchner-Ronne Ice Shelves.

J-51716
Ishida, A., **Effects of partial meridional barriers on the Antarctic Circumpolar Current—Wind-driven barotropic model,** *Dynamics of atmospheres and oceans,* May 1994, 20(4), p.315-341, 24 refs.

The structure and transport of the Antarctic Circumpolar Current are examined by means of a simple barotropic model. The effects of two partial meridional barriers corresponding to the South American peninsula and the island arc to the east are investigated. The transport is given by the ratio of the pressure difference produced by wind stress to the resistance resulting from bottom friction. In the limiting case with no friction, the pressure difference is determined by the magnitude of the wind stress at the latitudes of the ends of the two meridional barriers; the resistance is proportional to the difference between the Coriolis parameters at the same sites. The transport predicted by the model is reasonable when compared with the observed value. This suggests that the mechanism discussed can be applied to the real ocean. A relationship between the transport and the topographic drag on the meridional barriers is found. The time change of the transport is determined by the drag on the meridional barriers, the bottom stress, and the rate at which momentum is supplied by wind stress. The transport lags wind stress by several days. (Auth.)

J-51728
Liang, X.S., Dong, Z.Q., Su, J.L., **Condition for the formation of Antarctic Bottom Water in Prydz Bay, Antarctica,** *Antarctic research,* June 1994, 5(1), p.62-74, 15 refs.

Through pseudoinverse inference of the circulation in Prydz Bay and its adjacent open ocean during Jan.-Mar. 1981, and comparing the results with 1991, the authors found that when the east wind drift is strong and extends its influence north of the slope, it is difficult for the Circumpolar Deep Water (CDW) to upwell onto the shelf, and consequently the Antarctic Bottom Water (AABW) cannot form in the bay by way of the mixing scheme of Foster and Carmack (1976). However, when the east wind drift weakens and confines itself to the shelf, the westerly current will press on the slope and revolve anticyclonically while it is fairly strong. Such an anticyclonal pattern manifests itself mainly in the lower layer and, as a result, it will make the CDW upwell onto the shelf, providing an essential prerequisite for the formation of the AABW. The authors have analyzed this phenomenon from a dynamical viewpoint, and note that the law of heat conduction accounts for its formation, in which the planetary and topographical beta effects play major roles. (Auth. mod.)

J-51740
Takahashi, T., Goddard, J.G., Rubin, S.I., Breger, D., **Seasonal study of carbon dioxide in the southern extreme of the Pacific sector, antarctic ocean,** *U.S. Department of Energy. Progress report,* May 5, 1994, DOE/ER/61758-1, 12p., DE94 014600, 3 refs.

The major aim of this investigation was to measure the distribution of the total CO_2 concentration and pCO_2 in seawater in the Pacific sector of the extreme southern ocean as far south as 78S. The areas investigated include the continental shelf areas in the Ross, Amundsen and Bellingshausen seas and the offshore deep water areas as far north as 67S. The measurements were made aboard the R/VIB *Nathaniel B. Palmer* between Feb. 14 and Apr. 5, 1994; the preliminary results are briefly described in this report. This constitutes the first of a pair of expeditions, the first being designed to investigate oceanic CO_2 sink/source conditions during the austral summer, while the second expedition, which is designed for the following winter, has been scheduled for Sep. 1994.

J-51742
Gallo, J., et al, **Data analysis from the summer expedition of 1992-1993** [Análisis preliminar de los datos de la Campaña Antártica de Verano 1992/93. Proyecto Oceanografía Costera Brown], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1994, No.426, 50p., In Spanish with English summary. 12 refs.

During the 1992-93 antarctic summer season, within the framework of the Coastal Oceanography Project, intensive samplings in the area of Bahía Paraíso were carried out. The physical, chemical, meteorological and biological data collected were analyzed and are reported in this paper. (Auth.)

J-51771
Treguier, A.M., Panetta, R.L., **Multiple zonal jets in a quasigeostrophic model of the Antarctic Circumpolar Current,** *Journal of physical oceanography,* Nov. 1994, 24(11), p.2263-2277, 28 refs.

The presence of multiple zonal fronts in the Antarctic Circumpolar Current (ACC), a phenomenon described as zonation, has been confirmed by many observations, suggesting that the fronts are circumpolar in extent. In the context of quasigeostrophic turbulence models, Panetta has shown that fronts associated with long-lived zonal jets develop spontaneously in very wide baroclinically unstable regions (of width large compared with the Rossby radius of deformation). The present paper examines the relevance of this mechanism to the zonation of the ACC, using a quasigeostrophic wind-forced channel model. Multiple jets appear when the forcing scale is wide enough, and they have horizontal scales and a strength that compares well with observations. However, in the presence of large-scale random topography, a different dynamical regime emerges in which the flow structure depends on the topographically controlled stationary eddies. (Auth.)

J-51796

Foster, T.D., **Antarctic Bottom Water formation in the northwestern Weddell Sea,** *Antarctic journal of the United States,* 1993, 28(5), p.75-76.

As part of a project to study the formation of Antarctic Bottom Water in the Weddell Sea, an oceanographic expedition was carried out in the northwestern sector of the Weddell Sea. A preliminary analysis of the potential temperature data from a long hydrographic section is shown in a figure. The structure of the potential temperature field is similar to that which was obtained for this same section in 1987 and 1991, with the exception of the surface layers where there are some differences due to seasonal effects. More significantly, the region of newly formed bottom water, indicated by potential temperatures below about -0.8 C, closely resembled those of 1987 and 1991. This may be evidence that the bottom water forms all year long in the western Weddell Sea.

J-51797

Weppernig, R., Schlosser, P., **Helium isotope results from Ice Station Weddell 1,** *Antarctic journal of the United States,* 1993, 28(5), p.76-77, 6 refs.

As part of the Ice Station Weddell 1 hydrography/tracer program, the authors collected about 400 helium isotope samples. Most of the samples were taken along the drift track of the ice floe. The first helium isotope data show very low isotopic helium-3 values in a thin bottom layer (about 100 m thick) along the drift track of the ice station. The ^{4}He concentrations of the surface waters reflect the ice cover during the time of sampling. Gas exchange is reduced because of the ice cover, and ^{4}He accumulates as Circumpolar Deep Water (CDW) entrains into the surface layer. At station 9, the gradient between surface water and CDW is well pronounced, which is an indication of a well-mixed surface layer and rapid gas exchange with the atmosphere. The ^{4}He concentrations increase slightly with depth, and one generally observes a maximum at about 100 m above the bottom. The authors interpret this pattern as an indication that there are different types of shelf water contributing to the deep and bottom waters formed in the western Weddell Sea.

J-51798

Hellmer, H.H., Gordon, A.L., Albarracin, J.I., Huber, B.A., **Western Weddell Sea hydrography,** *Antarctic journal of the United States,* 1993, 28(5), p.78-79, 5 refs.

The U.S.-Russian Ice Station Weddell 1 (ISW-1) provided the first comprehensive data set for the perennially ice-covered western Weddell Sea. As a region of potentially significant formation of cold bottom water, the western Weddell is of key importance in understanding the southern oceans' role in global heat fluxes and ventilation of the world's deep ocean. The temperature and salinity maxima over the continental slope characterize the core of the Weddell Sea's coastal current, which, as the southern limb of the cyclonic circulation, provides to the Continental Shelf the salt required for bottom-water production and the heat lost by air-ice-sea interaction.

J-51800

Rogers, J.C., Dunbar, R.B., **Carbon isotopic composition of particulate organic carbon in Ross Sea surface waters during austral summer,** *Antarctic journal of the United States,* 1993, 28(5), p.81-83, 10 refs.

The areal distribution of particulate organic carbon (POC) standing stock and POC δ^{13}C in ice-free areas of the Ross Sea during the 1991-1992 austral summer is reported. High surface-water POC levels were observed in the western Ross Sea along the Victoria Land coast. POC levels were low, between 172 and 180E, and increased again to the east of the 180 deg. The highest POC δ^{13}C values to the northeast of Ross I. are associated with low POC levels. The authors also observed significant ^{13}C depletion in areas of moderate POC concentration and ^{13}C enrichment in areas with low POC (east of site C). Transit samples collected from *Polar Sea* between Feb. 6-9, 1992 along the southern sampling transect show a significant positive correlation between δ^{13}C and POC.

J-51815

Matthies, D., Troll, G., **Distribution of fluorine in recent marine sediments related to petrographic composition: Bransfield Strait and northwestern Weddell Sea, Antarctica,** *Marine geology,* 1990, 91(4), p.313-324, 46 refs.

The fluorine budget of 40 marine surface sediment samples from the Atlantic sector of the antarctic seas has been examined in order to elucidate the relationship between granulometry, mineralogy, major and minor element chemistry, and the fluorine distribution. The concentrations of total fluorine range from 243 to 800 ppm. The clay and fine-silt fractions contribute 60-87% to the total concentration of fluorine. The clay fraction consists of clay minerals, detrital quartz, feldspars and an amorphous component (biogenic opal and volcanic glass shards). Fluorine concentrations in the crystalline components of Bransfield Strait and Weddell Sea sediments are 551-557 and 724-825 ppm, respectively. These variations are almost exclusively due to varying proportions of illite, which is greatly enriched in fluorine. Montmorillonite and mixed-layer clays, which carry approximately as much fluorine as illite, are present only in insignificant amounts in these sediments. Biogenic opal (essentially diatom skeletons), which accounts for 3-77 wt.% of the clay fraction, contains 15 ppm fluorine. Thus, fluorine abundance in the clay fraction is negatively correlated with the content of biogenic opal. Volcanic glass shards contain 1688-3758 ppm fluorine. They comprise only up to 3 wt.% of the clay fraction and are of minor relevance in the total fluorine budget in these sediments. (Auth. mod.)

J-51832

Ackley, S.F., Sullivan, C.W., **Physical controls on the development and characteristics of antarctic sea ice biological communities—a review and synthesis,** *Deep-sea research pt.I,* 1994, 41(10), p.1583-1604, Refs. p.1600-1604.

Ice structures found in antarctic sea ice and related morphological processes are summarized, including frazil ice growth; the flooded snow layer; pressure ridge induced flooding; thermally driven brine drainage; and platelet-ice formation. The associated colonization, physiological adaptation, and growth of sea ice biota within these structures, to the levels presently identifiable, are also reviewed. Variability of ice structure and associated biological communities over small spatial scales necessitated analysis of the biological component in combination with physical and chemical properties of the sea ice. The ice microstructure provides indications of the growth and evolution of ice properties and initially defines how ice biota colonize the ice. While the ice microstructure shapes the localized biological response, relatively large regions of pack ice have characteristic microstructures. Regional patterns of biomass and biological productivity within the antarctic sea ice zone may therefore be predictable as a result of these physical-biological associations. Examples from the drifting pack ice and fast ice zones of the Weddell and Ross Seas are given. (Auth. mod.)

J-51874

Johannessen, O.M., ed, Muench, R.D., ed, Overland, J.E., ed, **Polar oceans and their role in shaping the global environment,** *American Geophysical Union. Geophysical monograph series,* 1994, No.85, 525p., Refs. passim. Contributions to the Nansen Centennial Symposium, Bergen, Norway, June 21-25, 1993. For selected papers see 49-2075 through 49-2109, or F-51877, F-51879, F-51880, J-51876, J-51878, J-51881, and J-51882.

Topics include polar ocean circulation, water masses, convective processes, carbon cycles, global climate, and ice-ocean-atmosphere interaction. Eight papers out of 35 are pertinent to the Antarctic, which deal with the distribution of water masses on the continental shelf in the Weddell Sea; radioactive isotopes in the Weddell Sea; sea ice ridging in the Weddell Sea; CO_2 fluxes in the southern ocean; sea ice thickness and climate; atmospheric forcing in thermodynamic sea ice models; surface heat fluxes in the Weddell Sea; and satellite altimetry of sea states in the southern ocean.

J-51875

Gammelsrød, T., et al, **Distribution of water masses on the continental shelf in the southern Weddell Sea,** *American Geophysical Union. Geophysical monograph series,* 1994, No.85, Polar oceans and their role in shaping the global environment. Edited by O.M. Johannessen, R.D. Muench, and J.E. Overland, p.159-176, 35 refs.

Water properties on the continental shelf in the southern Weddell Sea observed during NARP 92-93 are presented. The station distribution includes a section close to the floating ice shelf from the Filchner Depression to the Antarctic Peninsula. Temperature, salinity, oxygen, silicate, CFC-11 and CFC-12 distributions are shown. Melting under the ice shelves, circulation systems, residence times, sediment/water interactions and bottom water formation are discussed. Ice Shelf Water (ISW), which is formed by cooling and melting below the floating ice shelf, seems to be about 10 years older than its parent water mass, which indicates the residence time below the ice shelf. The average melting rate below the Filchner Ronne ice shelf, based on the volume flux of ISW in the Filchner Depression, is estimated to be 0.1 m/year. Compared with earlier observations, considerable changes were found in the water characteristics and distribution; the temperature of the Weddell Deep Water has increased 0.7 C since 1977. Western Shelf Water, usually dominating the bottom layers in the Filchner Depression and on the Berkner Shelf, was found only in the Ronne Depression. (Auth.)

J-51876

Rutgers van der Loeff, M.M., **^{228}Ra and ^{228}Th in the Weddell Sea,** *American Geophysical Union. Geophysical monograph series,* 1994, No.85, Polar oceans and their role in shaping the global environment. Edited by O.M. Johannessen, R.D. Muench, and J.E. Overland, p.177-186, 35 refs.

^{228}Ra and its granddaughter ^{228}Th were measured on a N-S transect from 45S to the Antarctic continent across the Antarctic Circumpolar Current (ACC) and the Weddell Sea. The distributions of ^{230}Th, ^{228}Th and ^{228}Ra show that southward transport across the ACC of Circumpolar Deep Water (CDW), the source of Warm Deep Water (WDW) in the Weddell Sea, occurs on a time scale between 8 and 30 years, in qualitative agreement with estimates of the upwelling rate of WDW. The distribution of ^{228}Ra in deep waters is controlled by advection and isopycnal mixing rather than diapycnal mixing. In the Weddell Sea, deep-water ^{228}Ra activities reach 15-20 dpm/m^3. Enrichment in deep water is controlled by the production in the deep-sea floor, favored by low biogenic sediment accumulation rates and consequently high ^{232}Th contents in the surface sediment (3 to 5 dpm/g). The highest ^{228}Ra value (73 dpm/m^3) was observed near the sea floor in a channel where an eastern outflow of Weddell Sea Bottom Water (WSBW) is suspected. It is not yet known whether this value is produced *in-situ* by accumulation in the stratified bottom water, or contains a signal of enrichment in shelf- and Ice Shelf Water.

J-51878

Poisson, A., et al, **Air-sea CO_2 fluxes in the Southern Ocean between 25E and 85E,** *American Geophysical Union. Geophysical monograph series,* 1994, No.85, Polar oceans and their role in shaping the global environment. Edited by O.M. Johannessen, R.D. Muench, and J.E. Overland, p.273-284, 22 refs.

The variations of ΔfCO_2 (difference of sea surface and atmospheric carbon dioxide fugacities) and air-sea CO_2 fluxes are described in the western Indian sector of the southern ocean. Measurements were made during two cruises in Jan.-Apr. 1991 and one cruise in Feb. 1993. ΔfCO_2 distributions observed in Feb. 1987 and Feb. 1993 at 30E are also compared. Large ΔfCO_2 variations have been observed, most of which can be related to dynamical variability and/or local biological activity, near the ice edge, the Antarctic Divergence, the Polar Front Zone or local change in topography (e.g. Kerguelen Plateau). Near the pack ice, clear relationships are found between low ΔfCO_2 (CO_2 sink area) and high chlorophyll-a concentrations. A significant CO_2 source region was found in Feb. 1993 centered on the antarctic divergence. South of the Polar Front Zone, fCO_2 decreases strongly; this signal was also found in 1987 and 1991 and can be related to high chlorophyll signal. In the region of the Kerguelen Plateau, ΔfCO_2 spatial variability is very high. Comparing years 1987 and 1993 reveals that when considering interannual variability (mainly related to SST differences between the two periods) the change in ΔfCO_2 has been low over 6 years. (Auth. mod.)

J-51881

Launiainen, J., Vihma, T., **On the surface heat fluxes in the Weddell Sea,** *American Geophysical Union. Geophysical monograph series,* 1994, No.85, Polar oceans and their role in shaping the global environment. Edited by O.M. Johannessen, R.D. Muench, and J.E. Overland, p.399-419, 60 refs.

Turbulent surface fluxes of sensible and latent heat in the Weddell Sea were studied using drifting marine meteorological buoys with satellite telemetry. In 1990-1992 a total of 5 buoys were deployed on the sea ice, in the open ocean, and on the edge of a floating continental ice shelf. Buoy measurements included wind speed, air temperature and humidity with duplicate sensors, and yielded year-round time series. Modification of the continental air-mass flowing out from the shelf ice to the open sea was studied with aerological soundings made from a research vessel. Associated turbulent heat exchange was estimated on the basis of three methods: modification in the temperature profiles, surface observations, and diabatic resistance laws for the atmospheric boundary layer. If one estimates an area-averaged turbulent heat exchange between the surface and the atmosphere for the whole Weddell Sea on the basis of these data, the large upward fluxes from leads and coastal polynyas (with an areal coverage of 5 to 7% in wintertime) approximately balance the downward fluxes over the sea ice. A first-order estimate for the annual area-averaged total vertical heat loss from the water mass is 20 to 30 W/m^2. (Auth. mod.)

J-51882

Campbell, W.J., Josberger, E.G., Mognard, N.M., **Southern Ocean wave fields during the austral winters 1985-1988, by Geosat radar altimeter,** *American Geophysical Union. Geophysical monograph series,* 1994, No.85, Polar oceans and their role in shaping the global environment. Edited by O.M. Johannessen, R.D. Muench, and J.E. Overland, p.421-434, 16 refs.

The Geosat radar altimeter is the first satellite sensor to have acquired a global sea state data set over a period of several years. The Geosat altimeter observations over the southern ocean have been processed to derive the austral winter seasonally averaged wave fields from 1985 through 1988. With the satellite observations, the highest sea states for each of the four austral winters are found south of latitude 40S and can reach the antarctic ice edge. In general, the highest Geosat mean significant wave heights are of the order of 4 to 5 m, and within each ocean there is a significant annual variation in the extent of these regions with large wave heights. In the region south of 50S, 30 to 50% of the measured wave heights are greater than 5 m. The Indian Ocean south of 40S is almost entirely covered with these large waves while the Atlantic Ocean is significantly calmer, with only the eastern portion containing such large waves, which do not occur every year. (Auth. mod.)

J-51962

Thomas, J.P., Turner, J., Symon, C.J., **Comparison of ATSR and shipboard radiometer SST measurements along transects between the U.K. and the Antarctic,** Space at the service of our environment: proceedings of the first ERS symposium, Nov. 1992, Cannes, France. Edited by B. Kaldeich, Noordwijk, Netherlands, ESA Publications Division, 1993, p.801-805, 3 refs.

Between Oct 1991 and May 1992 a campaign to make *in-situ* SST measurements to validate the ATSR SST product was carried out from the RRS *Bransfield* as it sailed from the UK to Antarctica and back. The ship carried an infrared radiometer, a temperature sensor trailed from the side and a hull thermistor. The results show that the present ATSR SST product gives results cooler than the *in-situ* measurements. In the tropics the difference was 1K except in the one case where the forward view was used in the retrieval, when agreement was within 0.1 K.

J-51983

Goosse, H., Hecq, J.H., **Modelling the ice-ocean-plankton**

interactions in the southern ocean, *Journal of marine systems,* Dec. 1994, 5(6), p.471-484, 63 refs.

Using the Ross Sea as a model, this paper examines interactions between sea ice and ocean and their influence on planktonic communities using a physical model which includes explicity melting dynamics and mixed-layer physics. A one-dimensional model of the water column with a k-1 turbulent closure is applied. The sea-ice model is the one proposed by Semtner (1976); added is a parameterization of leads. This study emphasizes the importance in this kind of model of the sharing of the energy between lateral and basal meltings. The biological model comprises two state variables: phytoplankton and zooplankton biomasses. Melting induces a persistent shallow mixed layer and thus appropriate conditions for primary production. If ice melting is present, high biomasses are possible even with high losses. The absence of ice nearly forbids a massive bloom to form. Some sensitivity studies have shown that grazing pressure is a key factor governing the evolution of biomasses. The biomasses are also sensitive to small modifications of photosynthetic production. The initial amount of phytoplankton and the presence of ice algae seem to be of lesser importance. (Auth. mod.)

J-51984

Domack, E.W., Foss, D.J.P., Syvitski, J.P.M., McClennen, C.E., **Transport of suspended particulate matter in an antarctic fjord,** *Marine geology,* Nov. 1994, 121(3-4), p.161-170, 19 refs.

Vertical profiles of temperature, salinity, and light attenuation were used in conjunction with underwater photography and water samples to characterize the nature and dynamics of particle transport in an antarctic fjord. Most of the particles are sand-sized (0.1-2 mm) floccules comprised of individual grains in the 5 to 50 micron size range. The quartz silt grains are derived from basal debris-laden meltwater originating from beneath the submerged valley glacier. The meltwater buoyantly rises to form cold water interflows at mid-water depths. Turbulent mixing near the seafloor also plays a role in the transport and breakup of floccules. Together the midwater cold tongues and near-bottom turbidity account for 87% of the total sediment load, thus attesting to the importance of non-surface transport mechanisms in polar fjords. (Auth. mod.)

J-51988

Howington, J.P., McFeters, G.A., Jones, W.L., Smith, J.J., **Effect of low temperature on BOD in antarctic seawater,** *Water research,* Dec. 1994, 28(12), p.2585-2587, 11 refs.

Untreated sewage has been released from McMurdo Station into McMurdo Sound for several years. In this study organic carbon degradation was compared in seawater from McMurdo Sound at -1.8°C and 20°C using the biochemical oxygen demand (BOD) test. The ultimate BOD was 3 times larger at 20°C than at -1.8°C following 25 days of incubation. On the basis of on these findings, sewage from McMurdo Station should receive at least secondary treatment before release to lessen the impact of anthropogenic organic carbon on the polar marine environment of McMurdo Sound. (Auth. mod.)

J-52006

England, M.H., Garçon, V.C., **South Atlantic circulation in a world ocean model,** *Annales geophysicae,* Oct. 1994, 12(9), p.812-825, 57 refs.

Preliminary analysis of the modelled ocean circulation in the region indicates a rather close agreement of the simulated upper ocean flows with conventional notions of the large-scale geostrophic currents in the region. The modelled South Atlantic Ocean witnesses the return flow and export of North Atlantic Deep Water (NADW) at its northern boundary, the inflow of a barotropic Antarctic Circumpolar Current (ACC) through the Drake Passage, and the inflow of warm saline Agulhas water around the Cape of Good Hope. Topographic steering of the ACC dominates the structure of flow in the circumpolar ocean. The Benguela Current is fed by a mixture of saline Indian Ocean water and fresher subantarctic surface water. This analysis shows how the return path of NADW is partitioned between a cold water route through the Drake Passage (6.5 Sv), a warm water route involving the Agulhas Current shedding thermocline water westward (2.5 Sv), and a recirculation of intermediate water originating in the Indian Ocean. (1.6 Sv). (Auth. mod.)

J-52007

Stevens, D.P., Thompson, S.R., **South Atlantic in the fine-resolution antarctic model,** *Annales geophysicae,* Oct. 1994, 12(9), p.826-839, 38 refs.

The geographical area covered by the Fine-Resolution Antarctic Model (FRAM) includes that part of the South Atlantic south of 24°S. A description of the dynamics and thermodynamics of this region of the model is presented. Both the mean and eddy fields in the model are in good agreement with reality, although the magnitude of the transients is somewhat reduced. The heat flux is northward and in broad agreement with many other estimates. Agulhas eddies are formed by the model and propagate westward into the Atlantic providing a mechanism for fluxing heat from the Indian Ocean. The confluence of the Brazil and Falkland currents produces a strong front and a large amount of mesoscale activity. In the less stratified regions to the south, topographic steering of the antarctic circumpolar current is important. (Auth.)

J-52008

Fahrbach, E., Rohardt, G., Schröder, M., Strass, V., **Transport and structure of the Weddell Gyre,** *Annales geophysicae,* Oct. 1994, 12(9), p.840-855, 33 refs.

Determination of the structure of the Weddell Gyre and of the associated transports was one of the objectives of the Weddell Gyre Study which began in Sep. 1989 and ended in Jan. 1993. The collected data set comprises records of moored current meters and profiles of temperature and salinity distributed along a transect between the northern tip of the Antarctic Peninsula and Kapp Norvegia. The circulation pattern on the transect is dominated by stable boundary currents of several hundred kilometers width at the eastern and western sides of the basin. They are of comparable size on both sides and provide nearly 90% of the volume transport of the gyre which amounts to 29.5 Sv. In the interior, a weak anticyclonic cell of 800 km diameter transports less than 4 Sv. Apart from the continental slopes, the near-bottom currents flow at some locations in an opposite direction to those in the water column above, indicating a significant baroclinic component of the current field. The heat transport into the southern Weddell Sea is estimated to be 3.48×10^{13} W. (Auth. mod.)

J-52009

García, M.A., et al, **Mesoscale variability in the Bransfield Strait region (Antarctica) during austral summer,** *Annales geophysicae,* Oct. 1994, 12(9), p.856-867, 17 refs.

The Bransfield Strait is one of the best-known areas of Antarctica's oceanic surroundings. In spite of this, the study of the mesoscale variability of its local circulation has been addressed only recently. This paper focuses on the mesoscale structure of local physical oceanographic conditions in the Bransfield Strait during austral summer as derived from the BIOANTAR 93 cruise and auxiliary remote sensing data. Data recovered from moored current meters also allow identification of transient mesoscale phenomena. (Auth.)

J-52010

Genco, M.L., Lyard, F., Le Provost, C., **Oceanic tides in the South Atlantic Ocean,** *Annales geophysicae,* Oct. 1994, 12(9), p.868-886, 27 refs.

The finite element ocean tide model of Le Provost and Vincent (1986) has been applied to the simulation of the M_2 and K_1 components over the South Atlantic Ocean. The discretisation of the domain, of the order of 200 km over the deep ocean, is refined down to 15 km along the coasts; such refinement enables wave propagation and damping over the continental shelves to be correctly solved. Zooms of the M_2 solution are presented for the Falkland Archipelago, the Weddell Sea and the Patagonian Shelf. The first zoom allows detailing of the tidal structure around the Falklands and its interpretation in terms of a stationary trapped Kelvin wave system. The second zoom, over the Weddell Sea, reveals for the first time what must be the tidal signal under the permanent ice shelf and gives a solution over the sea which is generally in agreement with observations. The third zoom over the complex Patagonian Shelf illustrates the ability of the model to simulate the tides, even over this area, with a surprising level of realism, following purely hydrodynamic modelling procedures, within a global ocean tide model. Maps of maximum associated tidal currents are also given, as a first illustration of a by-product of these simulations. (Auth. mod.)

J-52011

López, O., García, M.A., S.-Arcilla, A., **Tidal and residual currents in the Bransfield Strait, Antarctica,** *Annales geophysicae,* Oct. 1994, 12(9), p.887-902, 11 refs.

During the 1992-93 oceanographic cruise of the Spanish R/V *Hespérides,* recording equipment was deployed in the Bransfield Strait. Six Aanderaa RCM7 current meters and three Aanderaa WLR7 tide gauges were successfully recovered after an operation period of 2.5 months. Relevant features of the time series obtained are presented and discussed in this paper. The emphasis is placed on the tidal character of the currents and the relative importance of tidal flow in the general hydrodynamics of the strait. For these purposes a dense grid of hydrographic stations, completed during the BIOANTAR 93 cruise, is used. Preliminary geostrophic calculations relative to a 400 m depth yield current velocities of around 0.20 m/s in the study area, whereas the magnitude of tidal currents is seen to be 0.30-0.40 m/s. (Auth.)

J-52040

Popov, I.K., **Surface layer temperature of the southern ocean in iceberg penetration zones,** *Russian Academy of Sciences. Transactions. Earth science sections,* Nov. 1994, 328(1), p.220-223, 2 refs. For Russian original see 47-3337 or 21J-48305.

This paper presents an evaluation of the thermal state of the ocean surface in the iceberg-penetration zones, the initial information for which is the surface temperature distribution. The surface water temperature around individual drifting icebergs in the southern ocean south of the 60th parallel was observed under various hydrological conditions, with the temperatures of the upper quasihomogeneous level ranging from -1.5 to +2.5°C. During these temperature surveys, the ships circled the iceberg at various distances in the direction of a MGI 4202 temperature sensor. In some cases, remote IR-radiometry was used. In addition, the same towed temperature sensor was used to measure the horizontal distribution of surface-layer temperatures in a zone about 30 km long, located in the southernmost part of the iceberg path to the western Atlantic, at a time when the number of icebergs increased from 13 to 50 (as estimated from the field of view on the 15 mile scale of the ship's radar). (Auth. mod.)

J-52044

Mackensen, A., Grobe, H., Hubberten, H.W., Kuhn, G., **Benthic foraminiferal assemblages and the $\delta^{13}C$-signal in the Atlantic sector of the southern ocean: glacial-to-interglacial contrasts,** NATO Advanced Research Workshop on Carbon Cycling in the Glacial Ocean: Constraints on the Ocean's Role in Global Change, Fellhorst, Germany, Sep. 17-19, 1992. Proceedings. Quantitative approaches in paleoceanography. Edited by R. Zahn et al and NATO Advanced Science Institutes, Series I. Global environmental change. Vol.17, Berlin, Springer Verlag, 1994, p.105-144, 59 refs.

DLC GC190.2.C37 1994

This paper presents recent benthic foraminiferal faunal distributions and benthic foraminiferal $\delta^{13}C$ from various sites in the southern ocean. The data are used as an analogue for interglacial conditions and compared to down-core changes in three South Atlantic Ocean and Weddell Sea cores. The data are used to reconstruct glacial-interglacial contrasts in paleoproductivity and deep and bottom water circulation. New benthic foraminiferal and stable isotope data from two cores spanning the last 400 kyr are presented. (Auth. mod.)

J-52045

Zahn, R., Keir, R., **Tracer-nutrient correlations in the upper ocean: observational and box model constraints on the use of benthic foraminiferal $\delta^{13}C$ and Cd/Ca as paleo-proxies for the intermediate depth ocean,** NATO Advanced Research Workshop on Carbon Cycling in the Glacial Ocean: Constraints on the Ocean's Role in Global Change, Fellhorst, Germany, Sep. 17-19, 1992. Proceedings. Quantitative approaches in paleoceanography. Edited by R. Zahn et al and NATO Advanced Science Institutes, Series I. Global environmental change. Vol.17, Berlin, Springer Verlag, 1994, p.195-221, 34 refs.

DLC GC190.2.C37 1994

This paper employs the GEOSECS Shorebased Dataset (Östlund et al., 1987) to map the CO_2/phosphate distribution at high latitudes in order to examine the extent to which high-latitude processes determine the global tracer-nutrient pattern. The ocean-atmosphere $\delta^{13}C$-simulating box model of Keir (1988) is used to separate the effects of temperature and biofractionation on the disparate $\delta^{13}C$-PO_4 pattern at high latitudes. Subsequently, the results of an ocean box model which was designed to coarsely simulate the distribution of phosphate as well as other tracers is presented. The model results generally support the hypothesis of productivity-driven variations in the cadmium-nutrient relation, and further suggest that cadmium tends to be recycled slightly shallower in the water column than is phosphate. (Auth. mod.)

J-52046

Shimmield, G.B., Derrick, S., Mackensen, A., Grobe, H., Pudsey, C., **History of barium, biogenic silica and organic carbon accumulation in the Weddell Sea and Antarctic Ocean over the last 150,000 years,** NATO Advanced Research Workshop on Carbon Cycling in the Glacial Ocean: Constraints on the Ocean's Role in Global Change, Fellhorst, Germany, Sep. 17-19, 1992. Proceedings. Quantitative approaches in paleoceanography. Edited by R. Zahn et al and NATO Advanced Science Institutes, Series I. Global environmental change. Vol.17, Berlin, Springer Verlag, 1994, p.555-574, 51 refs.

DLC GC190.2.C37 1994

This paper presents geochemical data (biogenic silica, organic carbon, barium) to address changes in palaeoproductivity at 68°S in the eastern Weddell Sea. $\delta^{18}O$ measurements on planktonic and epibenthic foraminifera are used to provide a reliable age model. A transect of four cores across the Weddell Sea to the Scotia Sea is examined using the same proxy palaeoproductivity indicators. Similarities in the history of barium accumulation provide a means of establishing an approximate chronology. The age model has been corroborated in one core by using the excess ^{230}Th method. The results indicate that glacial productivity was indeed lower south of the APF, confirming the observations of Mortlock et al., (1991) and Charles et al., (1991). This study extends knowledge of southern ocean sediment geochemistry and indicates that significant palaeoceanographic records addressing the glacial productivity hypothesis can be recovered from the deep Scotia and Weddell seas. (Auth. mod.)

J-52116

Daniushevskaia, A.I., Petrova, V.I., Romankevich, E.A., **Geochemical features of the organic matter of bottom sediments in the antarctic sector of the Atlantic,** *Oceanology,* Oct. 1993, 33(2), p.175-181, Translated from Okeanologiia. 6 refs.

This study identifies the geochemical features of sedimentary organic matter in various morphostructural zones of the antarctic sector of the Atlantic. Included are background geochemical organic parameters for the shelf and deep-sea sediments from the Weddell and Scotia seas and the Bransfield Strait. Geochemical organic parameters are a sound indicator of environmental and facies variations in sediments and could be used for environmental monitoring of the world ocean. (Auth. mod.)

J-52126

Koshliakov, M.N., **Hydrological research in the Pacific Ocean sector of Antarctica (sixth cruise of the R/V *Akademik Ioffe* under the WOCE Program, December 10, 1991 to May 25, 1992),** *Oceanology,* Feb. 1994, 33(4), p.549-553, Translated from Okeanologiia. 4 refs.

A Russian/American expedition, carried out within the framework of the 6th cruise of the R/V *Akademik Ioffe* of the Shirshov Institute of Oceanology, Russian Academy of Sciences, took place during the period Dec. 10, 1991 through May 25, 1992 with the objective of investigating the hydrology, hydrochemistry and circulation of waters in the Pacific Ocean sector of Antarctica under the international WOCE (World Ocean Circulation Experiment) program. This program, with the participation of about 30 countries, including all the most developed countries of the world, is a scientific physical oceanography program of unprecedented scale. The field work will extend over the years 1991-97.

J-52172
Lara, R.J., Kattner, G., **Humic substances in the nitrogen cycle of polar waters. A comparison between the Arctic and Antarctic,** Humic substances in the global environment and implications on human health: proceedings of the 6th International Meeting of the International Humic Substances Society, Monopoli (Bari), Italy, September 20-25, 1992, edited by N. Senesi and T.M. Miano, Amsterdam, Elsevier, 1994, p.799-804, 20 refs.
DLC QD341.A2I55 1992

The contribution of humic substances to the dissolved nitrogen pool in antarctic and arctic waters is compared. Average dissolved organic nitrogen (DON) concentrations were similar in both regions (3-4 microM N). XAD-2 fractionation of dissolved organic matter showed that the hydrophobic acid fraction accounted for 20% of DON in the Antarctic (mean: 0.69 microM N) and 19% in the Arctic (mean: 0.77 microM N). The hydrophobic neutral fraction was 15% of DON in the Antarctic (mean: 0.5 microM N) and 25% in the Arctic (mean: 1.0 microM N). The hydrophilic fraction was ca. 60% of DON. (Auth.)

J-52185
Pearce, R.E., Marschall, R.A., Stinson, D.L., **Antarctic exploration using a non-constant diameter solid towed hydrophone array,** Offshore Technology Conference, 26th, Houston, TX, May 2-5, 1994. Proceedings. Vol.1, 1994, p.9-14, 27 refs. For another version see 49-1183 or 22J-51495.

Recent marine seismic surveys have been conducted in the Antarctic using non-constant diameter solid towed hydrophone arrays. These compact, robust towed hydrophone arrays were well-suited to antarctic exploration where (1) the levels of ambient noise could range from Knudsen Sea State 4 down to below Sea State Zero, (2) array repair would be extraordinarily difficult, and (3) oil-filled array leakage would be particularly damaging to this unique and pristine environment. (Auth. mod.)

J-52215
Rakusa-Suszczewski, S., **Environments of inlets, coves and lagoons in Admiralty Bay (South Shetland Islands, Antarctica),** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.163-167, 25 refs.

Admiralty Bay is the largest bay in the South Shetlands, covering some 122 km^2; the main body of the bay covers 52.3% of this area, with Mackellar and Martel Inlets together constituting 31.5%, and Ezcurra Inlet the remaining 16.2%. The bay's mean depth is 198.6 m, with the deepest part attaining some 279.7 m; Ezcurra, Mackellar, and Martel Inlets are considerably shallower. These inlets form postglacial hanging valleys above the central basin of Admiralty Bay, the latter opening widely into the Bransfield Strait. About 30% of the bottom of Admiralty Bay is covered by macroalgae. Kelps are attached to the bottom to 90-100 m depth. The total biomass of macroalgae in the bay was estimated at approximately 74,000 tons. The type of substrata in Admiralty Bay also affects the specific composition of benthic fauna.

J-52219
Lipski, M., **Transport of metal elements from land to coastal zone of antarctic shelf waters,** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.289-291.

In Feb. and Mar. of 1993, water samples from Admiralty Bay and its drainage basins were collected to determine whether streams and other freshwater inflows into the bay are increasing the water's concentration of some metal elements. No such evidence was found. The study was conducted on the hypothesis that traces of some metal elements in sea water can influence its primary productivity.

J-52226
Stramma, L., Peterson, R.G., Tomczak, M., **South Pacific Current,** *Journal of physical oceanography,* Jan. 1995, 25(1), p.77-91, 37 refs.

The purpose of this paper is to determine if there is an identifiable current band associated with the South Pacific STF (Southern Hemisphere Subtropical Front) and, if so, how it compares with those in the South Atlantic and South Indian Oceans. It is found that such a current band does exist, though it is significantly weaker than in the other two basins. The flow associated with the STF in the Tasman Sea does not appear to be continuous with that in the remainder of the South Pacific, so the term "South Pacific Current" is used here for only the flow east of New Zealand. Eddy heat and salt fluxes into the northern Antarctic Circumpolar Current in the Atlantic and Indian sectors might have the cumulative downstream effect of causing the northern Antarctic Circumpolar Current entering the Pacific sector to be anomalously warm and salty. Hemispheric charts in the atlas by Gordon and Molinelli (1982) indicate that such is the case. The relative weakness of the South Pacific Current thus appears due to a combination of effects arising from geomorphology, vertical structure of the South Pacific subtropical gyre, and eddy heat and salt fluxes into the northern Antarctic Circumpolar Current in the other two basins. (Auth. mod.)

J-52228
Blanchon, P., Shaw, J., **Reef drowning during the last deglaciation: evidence for catastrophic sea-level rise and ice-sheet collapse,** *Geology,* Jan. 1995, 23(1), p.4-8, 49 refs.

Elevations and ages of drowned *Acropora palmata* reefs from the Caribbean-Atlantic region document three catastrophic, meter-scale sea-level-rise events during the last deglaciation. These catastrophic rises were synchronous with (1) collapse of the Laurentide and antarctic ice sheets, (2) dramatic reorganization of ocean-atmosphere circulation, and (3) releases of huge volumes of subglacial and proglacial meltwater. This correlation suggests that release of stored meltwater periodically destabilized ice sheets, causing them to collapse and send huge fleets of icebergs into the Atlantic. Massive inputs of ice not only produced catastrophic sea-level rise, drowning reefs and destabilizing other ice sheets, but also rapidly reduced the elevation of the Laurentide ice sheet, flipping atmospheric circulation patterns and forcing warm equatorial waters into the frigid North Atlantic. (Auth. mod.)

J-52280
Wang, Y.H., Dong, H.L., Ren, D.Y., **Chemical characteristics of sea water in the Prydz Bay, Antarctica,** *Antarctic research,* Dec. 1994, 5(2), p.58-66, 7 refs. For Chinese original see 22J-50446.

Based on data collected in the summer of 1989-90, the relationship between the distribution of nutrients and productivity in Prydz Bay is discussed. Outside of the Amery Ice Shelf area, a large expanse of warm water with a high nutrient content, where the dissolved oxygen is up to 120% and the chlorophyll *a* concentration is more than 1.00 mg/cu m, establishes Prydz Bay as a high productivity area. The vertical distribution of chemical elements merges with a spring-like temperature layer, resulting in an abnormal vertical distribution of nutrients at 350 m depth. There is no discernible spring salinity layer. Various factors causing the abnormal distribution are discussed. (Auth. mod.)

J-52294
Determann, J., Grosfeld, K., Gerdes, R., Hinze, H., **Melting and freezing rates beneath Filchner-Ronne Ice Shelf from a 3D-ocean circulation model,** Filchner-Ronne Ice Shelf Programme, Report No.8 (1994), edited by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1994, p.12-29, 15 refs.

Melting and ice accretion provide fresh-water fluxes as well as latent heat fluxes across the ice-shelf/ocean boundary, causing horizontal pressure gradients and initiating a so-called "thermohaline circulation" in the sub-ice-shelf cavity. By making use of a 3D ocean circulation model, the authors try to quantify the horizontal extent of melting and freezing areas below the FRIS. This becomes especially important because of the influence of melting and accretion on ice-shelf rheology. The formation of ISW (Ice Shelf Water), which is a source for AABW (Antarctic Bottom Water), makes the ice shelf-ocean interaction important for the global abyssal water mass distribution.

J-52295
Fahrbach, E., Nixdorf, U., Oerter, H., Rohardt, G., **Tidal induced melting of the Ekström Ice Shelf in the southeastern Weddell**

Sea, Filchner-Ronne Ice Shelf Programme, Report No.8 (1994), edited by H. Oerter, Bremerhaven, Alfred-Wegener-Institute for Polar and Marine Research, 1994, p.20-23.

Interaction between ocean and ice shelf represents an important process of water mass formation and affects the stability and the development of an ice shelf. To investigate the relevant processes, CTD-measurements were carried out under the Ekström Ice Shelf in the southeastern Weddell Sea during austral summer 1992-93. The temperature and salinity profiles measured approximately 8 km in-shore from the edge of the ice shelf show a significant layering of the water column and time variability. Three distinct layers were observed. The top layer which is in contact with the base of the ice shelf extends approximately to 20 m. In this layer temperature and salinity normally increase continuously with depth. An intermediate layer with a thickness of about 50 m is characterized by a temperature maximum and salinity still increasing with depth. Depth and temperature of the maximum change significantly during a tidal cycle. In the bottom layer of about 100 m thickness, temperature and salinity increase with depth, however salinity has a weaker vertical gradient than in the upper layers. Due to the increasing salinity from top to bottom, the profile is stable in spite of the temperature inversion.

J-52303

Hubberten, U., **Amino acids and humic substances in the nitrogen cycle of polar oceans** [Aminosäuren und Huminstoffe im Stickstoffkreislauf polarer Meere], *Berichte zur Polarforschung,* 1994, No.153, 123p., In German with English summary. Refs. p.114-123.

Changes of particulate and dissolved organic substances within the marine cycle were studied in the Arctic (Polarstern ARK VIII/I), the Antarctic (Polarstern ANT XI/1b) and in a phytoplankton culture experiment. The mechanisms and lability of the different XAD-2-resin fractions of DOM towards degradation were investigated. Samples from the Greenland Sea showed a highly significant inverse correlation for dissolved inorganic (DIN) and dissolved organic nitrogen (DON). Despite very different concentrations of DIN, the average DON concentrations were quite similar (ca. 3-4 mM N) in the Arctic and in the Antarctic. Humic fractions contributed 44% and 35% to DON in Arctic and Antarctic respectively. On average, 60% of DON was not associated with humic fractions. The mean concentration of DON-HbN in the Arctic (ca. 1 mM N) was nearly twice as high as in the Antarctic. The relative uniformity in DON fractions is in accordance with the hypothesis of an inert fraction of DOM, undergoing a multiple slow recycling in the ocean. In both sampling regions TDAA was about 11% of DON with a highly significant correlation for both variables.

J-52313

Barber, M., Crane, D., **Current flow in the north-west Weddell Sea,** *Antarctic science,* Mar. 1995, 7(1), p.39-50, 39 refs.

Properties of the surface and bottom circulation in the northwest Weddell and south Scotia seas are examined. The bottom currents were recorded at heights from 5-800 m above the seabed, and surface velocities were obtained from the drift tracks of ARGOS buoys deployed in ice floes. The tidal regime is mixed and the power of motions at inertial frequencies is highly variable and most dominant in the Scotia Sea. Flow is influenced by topography, effects of which are seen in eddy features and the damping of inertial motions in some areas. The sea ice motion is shown to be influenced by the topography at very low frequencies whilst tidal periodicities observed in the northwestern Weddell Sea are below the noise threshold in the region of the study. In this area the higher frequency ice motion is mainly wind-driven with little of the energy being transferred to the underlying deep water. (Auth.)

J-52365

Shiomoto, A., Ishii, H., **Distribution of biogenic silica and particulate organic matter in coastal and oceanic surface waters off the South Shetland Islands in summer,** *Polar biology,* Jan. 1995, 15(2), p.105-113, Refs. p.112-113.

Biogenic silica (BSi), lithogenic silica (LSi), particulate organic carbon (POC) and nitrogen (PON), and chlorophyll *a* (Chl *a)* concentration levels were measured in the surface waters (<100 m) off the northern coast of the South Shetland Is. in summer 1991. High concentration levels of BSi and LSi were recorded in the oceanic area and the coastal area, respectively. However, no marked regional differences were observed for POC, PON and Chl *a* concentrations. The mean BSi/POC atomic ratio (±SD) in the oceanic area was 6 times that in the coastal area, except for the bloom situation. In contrast, the mean POC/PON atomic ratio was not significantly different in the coastal (5.9±1.4) and the oceanic area (5.2±1.7). *Nitzschia* spp. were the dominant diatoms in the oceanic but not in the coastal area. High BSi/POC ratios have been reported for blooms dominated by *Nitzschia* spp. even in coastal regions. It is suggested that the area difference in the BSi/POC ratios is probably related to the difference in species composition of phytoplankton and not to regional contrast. (Auth. mod.)

J-52412

Ishman, S.E., Domack, E.W., **Oceanographic controls on benthic foraminifers from the Bellingshausen margin of the Antarctic Peninsula,** *Marine micropaleontology,* Dec. 1994, 24(2), p.119-155, 54 refs.

Surface sediment samples collected from the Bellingshausen Sea continental margin of the Antarctic Peninsula were analyzed for benthic foraminifers. A total fauna including live and dead specimen counts was used to statistically identify discrete benthic foraminifer assemblages. Two major assemblages were defined: the *Bulimina aculeata* and *Fursenkoina* spp. Assemblages. The distribution of the *B. aculeata* and *Fursenkoina* spp. Assemblages are closely associated with the distribution of the two dominant bottom water masses on the continental margin, the Circumpolar Warm Deep Water and Weddell Sea Transitional Water. Their distributions cannot be related to organic carbon content or sediment texture of the surface sediments. The faunal composition of the Bellingshausen Sea margin assemblages and their water mass associations are similar to faunal-water mass relationships observed in the Weddell Sea and South Atlantic Ocean where *B. aculeata* is associated with Circumpolar Deep Water and *Nonionella iridea, N. bradii* and *Trifarina earlandi* are associated with Eastern Shelf and Modified Weddell Sea Water.

J-52469

Feron, R.C.V., **Southern ocean western boundary currents: comparison of fine resolution antarctic model results with Geosat altimeter data,** *Journal of geophysical research,* Mar. 15, 1995, 100(C3), p.4959-4975, 52 refs.

Variability in the major western boundary current systems of the southern ocean is studied by comparing results from the United Kingdom fine resolution antarctic model (FRAM) to 3 years of Geosat altimeter data. The analysis results from the complex altimeter observations were verified, and the interpretation of Geosat data in the three southern ocean western boundary systems was improved. The hypothesis that ring formations can be catalogued and studied from variations in the decorrelation time of successive sea level anomaly fields is confirmed by FRAM. Applying the technique to altimeter data of the Agulhas, Brazil/Malvinas and East Australian Currents showed that quasi-periodic ring formations take place, roughly every 100, 150, and 130 days, respectively. The FRAM model only generated periodic ring formations in the Agulhas and East Australian Currents, both with a very regular 125 to 130 day period. This period is clearly a model-favored harmonic (1/3 year) which is, however, close to the observations. (Auth. mod.)

J-52476

Akitomo, K., Awaji, T., Imasato, N., **Open-ocean deep convection in the Weddell Sea: two-dimensional numerical experiments with a nonhydrostatic model,** *Deep-sea research,* Jan. 1995, 42(1), p.53-73, Refs. p.72-73.

Numerical experiments with a two-dimensional nonhydrostatic model were carried out to investigate the generation processes of open-ocean deep convection, deep water formation and ventilation around the Maud Rise in the Weddell Sea. The thermobaric effect, i.e. an increase in the thermal expansion rate of sea water with pressure (water depth), is essential for the onset of deep convection in this region and for the overturning of the water column to occur abruptly. Thermal-like plumes induced by the thermobaric instability destroy the thermocline (halocline) and transport the cold and less-saline mixed layer water into the warm and more-saline underlying layer. Then the underlying water ascends to push the thermocline (halocline) up until it disappears at the sea surface. (Auth. mod.)

J-52480

Diester-Haass, L., **Middle Eocene to early Oligocene paleoceangraphy of the Antarctic Ocean (Maud Rise, ODP Leg 113, Site 689): change from a low to a high productivity ocean,** *Palaeogeography, palaeoclimatology, palaeoecology,* Feb. 1995, 113(2-4), p.311-334, 63 refs.

The sediment record from the middle Eocene (about 45 Ma) to the early Oligocene (about 33 Ma) on Maud Rise Site 689, Weddell Sea (paleodepth 1400-1650 m), has been studied by means of a coarse fraction analysis in order to reconstruct variations in surface water productivity and bottom water masses. Productivity has been estimated using carbonate dissolution and accumulation rates of radiolaria, diatoms, benthonic and planktonic foraminifers, sponge debris, ostracods and echinoids. Accumulation rates of *Bolboforma* spp. vary parallel to these proxies. Productivity increased with time; three episodes were found in which productivity increased sharply, and productivity varied cyclically with a period of 430 ky. In the late Eocene-early Oligocene period, 34.95-33.05 Ma, a further increase in productivity led to a strong dissolution of planktonic foraminifers in high productivity periods. The productivity increase is probably due to the increasing pole-equator temperature gradient which led to stronger atmospheric and oceanic turnover and mixing in the oceans. (Auth. mod.)

J-52506

Schlitzer, R., **Adjoint model for the determination of the mean oceanic circulation, air-sea fluxes and mixing coefficients** [Bestimmung von mittlerer ozeanischer Zirkulation, Oberflächenflüssen und Mischungskoeffizienten mittels der Adjungierten Methode], *Berichte zur Polarforschung,* 1995, No.156, 103p., With German summary. 54 refs.

The adjoint method has been successfully applied to obtain optimal circulation, air-sea fluxes and mixing coefficients that, in a steady model with exact mass, heat and salt conservation, can satisfactorily reproduce the measured distributions of temperature and salinity in the Atlantic. Profiles of horizontal velocities in the optimal model solution resemble initial geostrophic velocity profiles except for constant velocity shifts (the previously unknown reference velocities u_r) and the model circulation is considered to be consistent with the principle of geostrophy. Changes to the shapes of the geostrophic profiles can be controlled and kept small. The present method is a new approach to the classical problem of determining the reference velocities left unknown by pure geostrophic calculations. Here, the reference velocities are chosen such that the resulting circulation conserves field mass and leads to a correct prediction of temperature and salinity distributions in the ocean while satisfying heat and salt budgets exactly. The model is applied to the entire Atlantic Ocean from 80N through the Weddell Sea, about 70S. (Auth. Mod.)

J-52515

Pérez, F.F., Tokarczyk, R., Figueiras, F.G., Ríos, A.F., **Water masses and phytoplankton biomass distribution during summer in the Weddell Sea marginal ice zone,** *Oceanologica acta,* 1994, 17(2), p.191-199, With French summary. 43 refs.

This study, carried out between the Elephant and the Orkney islands, showed that spatial variability in the marginal ice-edge zone (MIZ) was greater than that found in open sea. Salinity and silicate contents point to the existence of two fronts: the first, near Elephant I., separates the Surface Antarctic Water coming from Drake Passage from the winter water originating in the Weddell Sea. This water is characterized by its high concentrations of nitrate and silicates. The second front, near the South Orkney Is., which undergoes the influence by a less saline water lens, is poor in nutrients and rich in chlorophyll. Water mass circulation reveals the existence of a series of convergences and divergences which alternate along the MIZ, together with different haline fronts. (Auth. mod.)

J-52530

Scarponi, G., Capodaglio, G., Toscano, G., Barbante, C., Cescon, P., **Speciation of lead and cadmium in antarctic seawater: comparison with areas subject to different anthropic influence,** *Microchemical journal,* Feb./Apr. 1995, 51(1/2), Hungaro-Italian Symposium on Spectrometry, 6th: Advances in Environmental Sciences, edited by G. Záray and T. Kántor, p.214-230, 25 refs.

The antarctic surface seawater of Terra Nova Bay was investigated by anodic stripping voltammetry (ASV) to study the distribution and complexation of lead and cadmium in an extremely remote region. Samples were analyzed to determine the total metal content, the metal distribution between free fraction and bound fraction, the content of ligands complexing metal, and the related conditional stability constants. Metal complexation was studied separately by titrating the sample with each of the metals and detecting the labile fraction by differential pulse anodic stripping voltammetry. Voltammetric titration data were processed according to the van den Berg-Ruzic procedure to determine metal complexation parameters. Results for lead and cadmium revealed the presence of one class of ligands. To evaluate the possible anthropic influence in metal content and speciation in seawater, antarctic results were compared to data obtained from the Pacific Ocean, the Atlantic Ocean, and the Adriatic Sea. The more significant findings include the different proportions of bound fractions of metals (70-80% in the Adriatic Sea compared to about 50% in antarctic waters). (Auth. mod.)

J-52579

Troll, G., Matthies, D., Hofstetter, A., Skeries, W., **Recent and subrecent marine sediments of the north-western Weddell Sea and the Bransfield Strait, Antarctica,** *Polarforschung,* 1994 (Publ. 1992), 62(2/3), p.129-144, With German summary. 106 refs.

This paper gives a comprehensive petrological description of the marine sediments of the northwestern Weddell Sea, the Powell Basin, South Orkney Island Plateau and the Bransfield Strait. While looking to the total grain-size spectra and the petrological composition, which are in close relationship to each other, a reconstruction of the sedimentation conditions as well as the stratigraphical position of the sediment samples becomes possible. Moreover, some aspects of the geological setting of the hinterland can be deduced from the coarse grain and heavy mineral fractions. This is of utmost importance because of the lack of outcrops in the region. The area of investigation extends from 57° to 66° south latitude and 38° to 67° west longitude, and covers an area of about 2,000,000 km^2. The sea floor topography is quite well known and is described only very briefly. The investigated area can be subdivided into three sub-areas, of which the Bransfield Strait forms the southern part, the Powell Basin the middle, and the Weddell Sea the northern part. (Auth. mod.)

J-52622

Bareille, G., Grousset, F.E., Labracherie, M., Labeyrie, L.D., Petit, J.R., **Origin of detrital fluxes in the southeast Indian Ocean during the last climatic cycles,** *Paleoceanography,* Dec. 1994, 9(6), p.799-819, 103 refs.

MS (magnetic susceptibility) flux profiles were used to examine the spatial and temporal detrital flux changes in this basin during the last climatic cycle. Results indicate a general increase in detrital material input during the coldest periods, suggesting a widespread phenomenon, at least on the basin scale. Mineralogical data, geochemical data, and $^{87}Sr/^{86}Sr$ isotopic ratios were used to determine the origin and transport mechanisms responsible for increased detrital flux during glacial periods. Tracers clearly indicate that the Crozet-Kerguelen province was a major source region of detrital in the western part of the basin during glacial times. In contrast, material of antarctic origin is well represented in the whole basin. Volcanic particles from Kerguelen and crustal particles from Antarctica were probably transported by the antarctic bottom water current and/or the circumpolar deepwater current during glacial periods, as is the case today. (Auth. mod.)

J-52624

Ramsay, A.T.S., Sykes. T.J.S., Kidd, R.B., **Waxing (and waning) lyrical on hiatuses: Eocene-Quaternary Indian Ocean hiatuses as proxy indicators of water mass production,** *Paleoceanography,* Dec. 1994, 9(6), p.857-877, 109 refs.

On the basis of the temporal distribution of hiatus terminations, eight 3 m.y. time slices were selected for plotting the paleogeographical distribution of hiatus terminations. These distributions define areas of potential hiatus development, which formed along flow paths of proto-Antarctic Bottom Water and proto-Antarctic Intermediate Water. Expansion and contraction of these areas suggested changes in the volume of these water masses, which modified the distribution patterns of erosive deepwater currents and corrosive bottom water. Consequently, the spatial and bathymetric distribution of hiatus formation was altered. Age-depth analysis of hiatuses from sites within post-late Eocene areas of potential hiatus development was used, in conjunction with models of the behavior of unconformity boundaries within fluctuating water masses, to construct waxing/waning curves for proto-Antarctic Bottom Water and proto-Antarctic Intermediate Water. These curves define volume changes in the production histories of these water masses which were related to the post-late Eocene glacial history of Antarctica. (Auth. mod.)

J-52625
Weber, M.E., Bonani, G., Fütterer, K.D., **Sedimentation processes within channel-ridge systems, southeastern Weddell Sea, Antarctica,** *Paleoceanography,* Dec. 1994, 9(6), p.1027-1048, 110 refs.

On the continental margin of the southeastern Weddell Sea several channel-ridge systems can be traced on the eastern side of the Crary Fan. The stratigraphy of recovered sediments there is based on accelerator mass spectrometer ^{14}C determinations, stable oxygen and carbon isotopes analyses and paleomagnetic measurements. The sediments represent a period from the last glacial maximum (LGM) to recent time. Four different sedimentary facies are distinguished and assigned to processes controlling sedimentation. A substantial environmental change at 19.5-20 ka is documented in the sediments by a gradual change from lamination to bioturbation. During the recent interglacial, bioturbated sediments were deposited in all parts of the terrace. Because of a reduction in contour current velocities, water masses of the Weddell Gyre gain a greater influence on sedimentation on the continental slope. (Auth. mod.)

J-52649
Metzl, N., Poisson, A., Louanchi, F., Brunet, C., Schauer, B., Bres, B., **Spatio-temporal distributions of air-sea fluxes of CO_2 in the Indian and Antarctic oceans—a first step,** *Tellus,* Feb.-Apr. 1995, 47B(1-2), p.56-69, 23 refs.

Sea surface and atmospheric measurements of carbon dioxide fugacity (fCO_2) made during 14 cruises in 1991, 1992 and 1993 are used to describe the seasonal and meridional variation of air-sea CO_2 flux into the antarctic, subantarctic, subtropical and tropical regions of the Indian Ocean. Seasonal zonal averaged air-sea CO_2 fluxes from shipboard measured sea surface and atmospheric fCO_2 as well as observed ship winds are first estimated. Depending on the gas transfer coefficient used, a sink of -0.22 or -0.43 Gt carbon from Jan. to Sep. is calculated for the band 50°S-20°S. From June to Sep., the tropical region is a source between 0.04 and 0.08 GtC. From Jan. to May, the southern ocean is a sink between -0.01 and -0.03 GtC. Observed air-sea CO_2 flux calculations are compared with reconstructed sea surface fCO_2 distributions obtained from climatological data (SST and wind). By using the in-situ data obtained in 1991, large-scale seasonal relations between sea surface fCO_2 and sea surface temperature (SST) are extracted and applied to the 1992 monthly climatological SST fields in the 50°S-20°S region only. (Auth. mod.)

J-52650
Schneider, B., Morlang, J., **Distribution of the CO_2 partial pressure in the Atlantic Ocean between Iceland and the Antarctic Peninsula,** *Tellus,* Feb.-Apr. 1995, 47B(1-2), p.93-102, 24 refs.

CO_2 partial pressure of surface water, $(pCO_2)_{sw}$, was measured continuously during two cruises in the Atlantic Ocean in Nov./Dec. 1991 and May 1992. A $(pCO_2)_{sw}$ profile between Iceland and the Antarctic Peninsula is obtained which demonstrates that along the investigated transect the Atlantic Ocean is largely a potential sink for atmospheric CO_2, especially at high latitudes, where partial pressure differences of -80 µatm to -100 µatm are observed. An attempt is made to identify the processes that control the $(pCO_2)_{sw}$ distribution pattern. Investigations at latitudes >40° in both hemispheres were performed during spring. Correlations between $(pCO_2)_{sw}$ and chlorophyll *a* contents indicate that biological production mainly controls the distribution of $(PCO_2)_{sw}$. At lower latitudes, $(pCO_2)_{sw}$ is mainly related to temperature and salinity, but also an upwelling effect could be identified close to the equator. (Auth. mod.)

J-52680
Pontrelli, G., Purini, R., **Influence of the wind forcing and of the changing of Coriolis parameter on the Ross Sea tidal circulation,** *Il nuovo cimento,* July/Aug. 1993, 16C(4), p.335-347, 22 refs.

The combined effect of wind stress and the latitudinal variation of the Coriolis parameter on the tidal circulation of the Ross Sea is studied. To enhance the role of these forcing terms, the present model, based on two-dimensional shallow-water equations, echoes that of an earlier study to facilitate the comparison of the basic tidal regime. The numerical technique is described in detail along with its stability and accuracy properties. The numerical results are compared with data from direct measurements and with earlier simulations. (Auth.)

J-52684
Kuo, B.Y., Hung, S.H., Chiao, L.Y., **3-D dynamic model for the anomalous topography and geoid over the south-east Indian Ridge,** *Geophysical journal international,* Apr. 1995, 121(1), p.1-20, 43 refs.

The anomalous sea-floor topography and geoid height over the Australian-Antarctic Discordance (AAD) are examined and attributed to dynamic mantle flow in this study. The 3-D flow driven by the thermal anomaly is predominantly east-west oriented with a major downwelling near the AAD and its aged mantle. A simple formula is derived to estimate the mantle temperature beneath the ridge from the subsidence rates of topography and geoid for different corridors. This estimation yields a variation of about ±200°C, with the low near AAD and high at the segment to the east. The trend of variation is consistent with that from the dynamic modelling, and the magnitude is relatively high but favors the model in which the dynamic source is concentrated within the upper asthenosphere. The advection effect is estimated to cause a decay of the dynamic topography at a rate of the order of 0.005 km/Myr, making the downwelling die out very slowly with age. (Auth. mod.)

J-52696
Bulgakov, N.P., Lomakin, P.D., **Effect of subantarctic water mass on the characteristics of the SOFAR channel in the South Atlantic Ocean,** *Oceanology,* June 1994, 33(6), p.740-744, Translated from Okeanologiia. 13 refs.

The results of submerged sound channel research (SOFAR) in the South Atlantic Ocean in relation to the large-scale thermohaline structure of the core of the Antarctic Intermediate Water are given. The parameters of the SOFAR channel in different climatic zones of the southern and northern Atlantic Ocean were subjected to comparative analysis. The effect of a large-scale temperature inversion in the core of the subantarctic waters on the characteristics of the underwater sound propagation is considered in a ray approximation. (Auth. mod.)

J-52697
Romankevich, E.A., Peresypkin, V.I., **Dissolved and suspended particulate organic matter in antarctic waters of the Atlantic Ocean,** *Oceanology,* June 1994, 33(6), p.761-767, Translated from Okeanologiia. 10 refs.

On the basis of 332 analyses of dissolved (DOC) and particulate organic carbon (POC) taken from the surface to 4785 m depth at 10 stations in the Atlantic part of the southern ocean, the following regularities were determined: low DOC concentration, a sharp decrease in values in the upper 40-120 m, small changes deeper in the water column, a drop in concentrations in the Antarctic Divergence zone, the absence of a correlation between DOC and primary production of plankton. A decrease in average POC concentrations with depth when there is a small gradient in the 0-200 m water layer and an increase in POC concentrations in the pycnocline and during a phytoplankton bloom were found. The southern ocean is characterized, as a whole, by small POC concentrations close to the average values for the world's oceans. (Auth. mod.)

J-52714
Amos, A.F., **RACER: Data reports,** *Antarctic journal of the United States,* 1993, 28(5), p.157-158, 4 refs.

The austral winter of 1992 saw the fourth and final field season of the RACER (research on antarctic coastal ecosystem rates) program. The RACER program study area was primarily the Gerlache Strait with some stations in the Bransfield Strait to the north and the Grandidier Channel to Marguerite Bay in the south. A table shows the details of each of the cruises. This article describes the availability of standard physical, chemical, and biological oceanographic station data as well as surface data (including meteorological parameters) when the ship was underway. The data reports are intended to disseminate the conventional oceanographic information.

J-52716

Amos, A.F., **RACER: The tides at Palmer Station,** *Antarctic journal of the United States,* 1993, 28(5), p.162-164, 6 refs.

In Jan. 1992, an ENDECO model 1029 water-level recorder was installed at the dock at Palmer Station. The goal of the project was to obtain tide data during the research on antarctic coastal ecosystem rates (RACER) and Antarctic Marine Living Resources (AMLR) projects. The pressure gauge is located at a mean depth of 3.275 m in a heavy-walled steel pipe welded to the dock bulkhead, and the recording module is mounted directly above it. The pipe acts as a stilling well. Differential pressure and sea temperature are recorded on a digital data cartridge at 10-min intervals. At monthly intervals, the cartridges are removed and read on-station using the personal computer reader/interface. The raw data record is "zipped" (compressed), encoded, and transmitted via e-mail to the University of Texas Marine Science Institute.

J-52717

Tilbrook, B.D., Karl, D.M., **RACER: Methane enrichments in Port Foster, Deception Island,** *Antarctic journal of the United States,* 1993, 28(5), p.165-166, 14 refs.

During the RACER program, methane distributions in antarctic coastal waters of the Bransfield Strait, the Gerlache Strait, and in the southern oceans waters of the Drake Passage were examined. The objectives of the study were to identify the factors controlling methane distributions in antarctic shelf and open ocean environments and to evaluate the contribution these regions make to the sea-air flux of methane. As one small component of this larger study, the authors also occupied a single hydrostation in Port Foster, Deception I. They present the water-column methane distribution from this unique, partially submerged volcanic caldera and compare these values with samples collected in surrounding surface waters.

J-52733

Amos, A.F., **AMLR program: Interannual variability in the Elephant Island surface waters in the austral summer,** *Antarctic journal of the United States,* 1993, 28(5), p.201-204, 6 refs.

The austral summer of 1992-93 was the 4th field season of the U.S. AMLR program that included a physical oceanography component to study the Elephant I. regional hydrography. In this study, a preliminary evaluation of interannual variability in the upper water column was made using a simple quasivolumetric analysis technique. In total, 654 CTD stations were used in the analysis. A figure shows the temperature anomalies at the surface: 1990 and 1993 were warm years, whereas 1991 and 1992 were cold, 1992 being as much as 1.7°C cooler than 1990 in some locations and overall about 1°C cooler at the surface than 1990 and 1993. Differences were also recorded at other depths and in other parameters.

J-52735

Hofmann, E.E., Lipphardt, B.L., Jr., Smith, D.A., Locarnini, R.A., **Palmer LTER: Hydrography in the LTER region,** *Antarctic journal of the United States,* 1993, 28(5), p.209-211, 8 refs.

From Mar. 25 to May 15, 1993 an extensive hydrographic survey was made of the Palmer long-term ecological research (LTER) peninsula grid as part of a multidisciplinary cruise aboard the R/V *Nathaniel B. Palmer.* The survey covered an area that extended about 900 km alongshore and about 200 km offshore along the western side of the Antarctic Peninsula. These measurements represent the first extensive hydrographic regional coverage of the area west of the Antarctic Peninsula, an area that extends from the Bransfield Strait to the Bellingshausen Sea. This article presents preliminary results from analysis of these hydrographic data.

J-52739

Houlihan, T., Karl, D.M., **Palmer LTER: Dissolved silicic acid-nitrate relationships during austral autumn 1993,** *Antarctic journal of the United States,* 1993, 28(5), p.219-221, 15 refs.

Vertical profiles of silicic acid concentrations along the 10 across-shelf LTER station transects, exemplified by selected data for LTER line 800, displayed systematic patterns of nutrient depletion with increasing distance from shore. Nitrate concentrations also revealed surface-water depletions but did not display the strong spatial coherence observed for silicic acid. Based on a model 2 linear regression analysis of water samples collected at all stations and water depths, the authors conclude that the LTER study region exhibits a potential for "excess" nitrate at total silicic acid depletion. This contrasts sharply with data collected from the Ross Sea, which exhibit a silicic acid excess.

J-52741

Asper, V.L., Diercks, A.R., Karl, D.M., **Palmer LTER: The first profiles of marine snow aggregate abundance from Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.223-225, 9 refs.

Large aggregates (termed "marine snow") have been shown to be important or even dominant in the vertical transfer of material from the euphotic zone to the seafloor. During a recent cruise to the Antarctic Peninsula area aboard the R/V *Polar Duke*, the authors collected the first marine snow abundance data from Antarctica using the noncontact photographic profiling system developed by Honjo et al. (1984). These profiles show some of the highest concentrations of aggregates ever recorded by this system and, in general, are characterized by relatively low numbers near the surface, increasing abundances with depth, and maximum abundances near the seafloor. This abrupt transition into an intense nepheloid layer has not been described elsewhere and may have resulted from the density stratification that characterizes this region. In each of these profiles, the record abundances of aggregates in the bottom nepheloid layer may be indicative of resuspension or lateral transport of phytoplankton debris.

J-52742

Karl, D.M., Resing, J., Tien, G., Letelier, R., Jones, D., **Palmer LTER: Hydrogen peroxide in the Palmer LTER region. I. An introduction,** *Antarctic journal of the United States,* 1993, 28(5), p.225-226, 21 refs.

This is an introduction to three articles in this issue in which the authors present data on the distribution of H_2O_2 in the 200,000 sq. km. Palmer LTER study area. They summarize preliminary results on H_2O_2 sources and sinks for the local antarctic coastal region.

J-52743

Resing, J., Tien, G., Letelier, R., Karl, D.M., Jones, D., **Palmer LTER: Hydrogen peroxide in the Palmer LTER region. II. Water column distribution,** *Antarctic journal of the United States,* 1993, 28(5), p.227-229, 13 refs.

During the 1992-93 field season, the authors studied the seasonal variability of H_2O_2 in the surface waters of the Palmer LTER study region. Over 1,000 water samples were collected from 64°S to 68°S. The results to date suggest that H_2O_2 concentrations in the Palmer LTER region are lower than those observed in temperate and tropical marine habitats. Initial analyses of these data suggest that there is little variation in H_2O_2 concentrations over the course of the austral summer. Determination of the annual variability of H_2O_2 in this region with a winter cruise planned for Aug. 1993 will be important to supplement the current understanding of H_2O_2 dynamics in the region.

J-52744

Tien, G., Karl, D.M., **Palmer LTER: Hydrogen peroxide in the Palmer LTER region. III. Local sources and sinks,** *Antarctic journal of the United States,* 1993, 28(5), p.229-230, 7 refs.

During the austral spring and autumn LTER cruises aboard the R/V *Polar Duke,* in Nov. 1992 and R/V *Nathaniel B. Palmer* in Mar. through May 1993, the authors investigated selected sources and sinks of hydrogen peroxide in a variety of antarctic coastal habitats. These measurements constituted one component of the comprehensive study of H_2O_2 dynamics. The potential source terms evaluated were wet deposition (snow), glacial ice meltwater and land runoff, and *in situ* biological processes. It is concluded that both biological and photochemical sources and microbiological sinks of H_2O_2 must be considered in studies of southern ocean H_2O_2 dynamics.

J-52747

Lynch-Stieglitz, J., Fairbanks, R.G., Charles, C.D., **Glacial-interglacial history of antarctic intermediate water: relative strengths of antarctic versus Indian Ocean sources,** *Paleoceanography,* Feb. 1994, 9(1), p.7-29, 37 refs.

Sediment cores from the southern continental margin of Australia are near the formation region of Antarctic Intermediate Water (AAIW) and Subantarctic Mode Water, and record the changes in these water masses from the last glacial maximum through the present. Carbon and oxygen isotopes were measured on the benthic foraminiferal species *Planulina wuellerstrorfi* for both the Recent and last glacial maximum sections of the cores and were then used to reconstruct temperature and carbon isotopic water column profiles. The glacial oxygen isotope profile indicates a vertical temperature structure for this region similar to that in today's Subantarctic Zone. Today, AAIW properties reflect contributions from cool fresh Antarctic Surface Waters (2/3) and warm salty waters from the Indian Ocean (1/3). Data in this study suggest a much reduced contribution of North Indian Ocean intermediate water to glacial AAIW relative to the contribution of Antarctic Surface Water. This fresher, cooler glacial AAIW would be distributed to the intermediate-depth ocean, thus decreasing the transport of salt produced in the North Indian Ocean to the rest of the world's oceans. (Auth. mod.)

J-52844

Lisitsyn, A.P., **Ice sedimentation in the world ocean** [Ledovaia sedimentatsiia v Mirovom okeane], Moscow, Nauka, 1994, 447p. + 1 fold. map, In Russian. Refs. p.415-445.

This extensive work includes a study of recent iceberg and biogenic cryophilous deposits, the geology of ice-catchment provinces, and the petrography and mineralogy of sediments in Antarctica. Sedimentary rock basins in East and West Antarctica (including the Weddell Sea) and cryogenic facies (in the subglacial parts of the Weddell and Ross seas) are also discussed.

J-52948

Robinson, A., Makinson, K., Nicholls, K., **Oceanic environment beneath the northwest Ronne Ice Shelf, Antarctica,** *Annals of glaciology,* 1994, Vol.20, International Symposium on Antarctic Glaciology, 5th, Cambridge, England, Sep. 5-11, 1993. Proceedings, p.386-390, 19 refs.

Oceanographic data have been obtained from beneath the Ronne Ice Shelf at a site on the southeastern side of a sea-floor trough, the Ronne Depression. The data consist of 5 d of CTD profiling and a long-term temperature record from a thermistor cable. The water column was found to be composed of two layers: a cold buoyant layer of Ice Shelf Water (ISW) overlying a layer of unmodified Western Shelf Water (WSW). A change in the water column was observed on the last day of profiling, with the WSW layer thinning, a cold intrusion appearing directly above the WSW and the ISW becoming colder. In addition, on three profiles the ISW cooled further and increased in salinity, becoming apparently statically unstable. The temperature record from the thermistor cable confirms that the ISW layer occasionally becomes colder, with greater variation in temperature than seen on the CTD profiles. These low temperatures and high salinities are interpreted as indicating that water containing ice crystals in suspension has been advected beneath the site. (Auth.)

J-52971

Schneider, W., Nishio, F., Yamanouchi, T., Watanabe, O., Masuko, H., **SST estimation within Syowa's station mask using MOS-1's visible and thermal infrared radiometers,** *International journal of remote sensing,* Mar. 10, 1995, 16(4), p.613-624, 8 refs.

Since Feb. 1989, measurements from Marine Observatory Satellite 1 (MOS-1) have been received at Showa Station. The first set of MOS-1 visible and thermal infrared recordings from Showa is analyzed in this study. A method developed by Schüssel and Grassl is applied for ice and cloud filtering. For clear ocean pixels the sea surface temperatures are estimated by applying Muneyama's split window algorithm. A sea surface temperature composite of ten VTIR passes is presented. (Auth. mod.)

J-52977

Gornitz, V., **Sea-level rise: a review of recent past and near-future trends,** *Earth surface processes and landforms,* Feb. 1995, 20(1), p.7-20, Refs. p.18-20.

Recently reduced sea level rise (SLR) estimates are based on climate models that predict a zero to negative contribution to SLR from Antarctica. Most global climate models (GCMs) indicate an ice accumulation over Antarctica, because in a warmer world, precipitation will exceed ablation/snow-melt. However, the impacts of attritional processes, such as thinning of the ice shelves, have been downplayed according to some experts. Furthermore, not all climate models are in agreement. Opposite conclusions may be drawn from the results of other GCMs. In addition, the West Antarctic Ice Sheet is potentially subject to dynamic and volcanic instabilities that are difficult to predict. Because of the great uncertainty in SLR projections, careful monitoring of future sea-level trends by upgraded tide-gauge networks and satellite geodesy will become essential. (Auth. mod.)

J-52981

Abollino, O., Aceto, M., Sacchero, G., Sarzanini, C., Mentasti, E., **Determination of copper, cadmium, iron, manganese, nickel and zinc in antarctic sea water. Comparison of electrochemical and spectroscopic procedures,** *Analytica chimica acta,* Apr. 20, 1995, 305(1-3), p.200-206, 10 refs.

Different procedures for the determination of ultratrace metal ions in antarctic sea water have been adopted and critically compared. The investigated metal ions were Cd, Cu, Fe, Mn, Ni and Zn. Sea water samples were analyzed with adsorptive cathodic stripping voltammetry and with graphite furnace atomic absorption spectroscopy. Different treatments, such as UV irradiation, acidification and on-line sample enrichment were adopted. Results for samples collected in different sites and on a vertical profile are discussed and compared. (Auth.)

J-52983

Mantyla, A.W., Reid, J.L., **On the origins of deep and bottom waters of the Indian Ocean,** *Journal of geophysical research,* Feb. 15, 1995, 100(C2), p.2417-2439, Refs. p.2438-2439.

The characteristics of the deep and bottom waters of the Indian Ocean, when illustrated on potential-density anomaly surfaces, indicate that the waters enter from both the Atlantic and Pacific Oceans. The paths of spreading are constrained by the complex topography, and characteristics are altered by exchange with the overlying and underlying water and with the sediments, especially in the northern Indian Ocean. The Weddell Sea contributes to the densest waters found in the western basins and the Ross Sea and Adélie Coast to the densest waters found in the eastern basins. Both dense water varieties are altered by and incorporated in the less dense water above; initially, water carried by the circumpolar current, then water from the north Atlantic, and finally by deep water whose characteristics are derived in the northern Indian Ocean. (Auth. mod.)

J-52992

Dafner, E.V., Selin, P.IU., **Organic matter in waters of the SW Atlantic sector of the southern ocean,** *GeoJournal,* Jan. 1995, 35(1), p.71-77, 30 refs.

The 25th cruise of R/F *Akademik Knipovich* in Jan.-Apr. 1990 comprised investigations of total organic carbon (TOC) at the following sections: through the Polar Frontal Zone (PFZ) along 40°W; from the PFZ to the South Orkney Is., and on the South Georgia shelf. The measurements made comprised TOC, organic nitrogen, nitrate, nitrite, ammonium nitrogen, phosphate and silicate. The surface waters of the region were characterized by high heat content, which influenced the antarctic phytosynosis function. The data obtained showed low content of organic matter (OM); high content of TOC, rising up to 3.5 mg/m^3, was recorded at the photic layer and in the layer of OM accumulation, at the upper boundary of the Antarctic Deep Waters and the vertical boundaries of the Antarctic Intermediate Waters. The South Georgia shelf waters showed even distribution of TOC, about 0.2 mg/m^3, being under the influence of the south periphery of ACC waters. (Auth.)

J-53004

Odate, T., Fukuchi, M., **Physical and chemical properties of surface water in the southern ocean in summer 1991/92,** NIPR Symposium on Polar Biology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Jan. 1995, p.77-85, 15 refs.

Surface water temperature and salinity were continuously recorded in the southern ocean during the JARE-33 cruise in summer of 1991-92. Concentrations of nitrate-N plus nitrite-N and silicate-Si were also determined. Three oceanographic fronts were recognized based on the physical variables: the Subtropical Convergence, the Subantarctic Front, and the Antarctic Polar Front. Large meridional gradients of nutrient concentrations were observed in the fronts. The nutrient conditions are summarized as follows: Subtropical zone, both nutrient concentrations are below threshold; Subantarctic Zone, nitrate plus nitrite is several μM but silicate is still below threshold; Polar Frontal Zone, the former reaches ca. 20 μM and the latter increases several μM; Antarctic Zone, the former is ca. 20 μM and the latter is over 20 μM. (Auth. mod.)

J-53005

Odate, T., Fukuchi, M., **Distribution and community structure of picophytoplankton in the southern ocean during the late austral summer of 1992,** NIPR Symposium on Polar Biology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Jan. 1995, p.86-100, Refs. p.98-100.

In summer of 1992, three major oceanographic fronts, the Antarctic Polar Front, the Subantarctic Front, and the Subtropical Convergence, were recognized based on the degree of latitudinal gradients of surface water temperature and nutrient concentrations. These fronts divide the area into four distinct zones: the Antarctic Zone (ANZ), Polar Frontal Zone (PFZ), Subantarctic Zone (SAZ), and Subtropical Zone (STZ). Chlorophyll *a* concentration retained on a glass fiber filter (bulk CHL) was the most abundant in the SAZ. Although the bulk CHLs in the surface waters of the other water masses were almost the same, ca. 0.3 μg/l, the percent contributions of the pico fraction (less than 2 μm) were different: 74±5% (STZ), 43±11% (PFZ), and 23±11% (ANZ). The cell density of cyanobacteria (CY) was greater than that of other picophytoplankton (OP) north of the Subantarctic Front. The lowest cell densities of CY and OP were found in the surface water of the ANZ, the highest were noted in the SAZ. (Auth. mod.)

J-53011

Naganobu, M., Hisanaga, M., Shimadzu, Y., **Vertical distributions of temperature, salinity and geostrophic flow along 60°W in the southern ocean in January 1988. (Extended abstract),** NIPR Symposium on Polar Biology, Proceedings. No.8, Tokyo, National Institute of Polar Research, Jan. 1995, p.182-185.

The fifth antarctic ocean survey cruise by the R/V *Kaiyo Maru* of the Japanese Fisheries Agency was conducted in the waters between Drake Passage and the Scotia Sea during Jan. 13-16, 1988. Vertical distributions of temperature, salinity, density and geostrophic flow were obtained along the 60°W section, from the surface to near the sea bottom, and from 55°S to 62°S, near the South Shetland Is. Tabulated data are presented.

J-53017

Harada, N., Handa, N., Fukuchi, M., Ishiwatari, R., **Source of hydrocarbons in marine sediments in Lützow-Holm Bay, Antarctica,** *Organic geochemistry,* Mar. 1995, 23(3), p.229-237, 54 refs.

This paper attempts to reconstruct the paleoenvironment of the coastal region around Showa Station using organic compounds in marine sediments. A 129 cm long core sample of the oceanic sediment was collected in Lützow-Holm Bay. ^{14}C age showed a smooth pattern of change from about 3000 BP at the surface to 14,000 BP at the bottom, except for a change of age in the range of 80-120 cm depth. n-C_{21} was dominant in the low hydrocarbon content sections at the depths of 0-5, 60-65 and 120-125 cm of the core, whereas long-chain alkanes (C_{22}, C_{23}, C_{24}) were dominant in the high hydrocarbon content sections at depths of 45-50 and 90-95 cm. These characteristic distribution patterns of *n*-alkanes suggest that their major source probably is mixed altered and/or recycled material and recent organic material possibly derived from marine organisms. The differences in the δ^{13}C values of individual alkanes from the high and low hydrocarbon content sections of the core were not appreciable, suggesting a common source for these compounds. δ^{13}C values for organic matter in different sections of the core range from -26.0 to -28.5 per mill, indicating that its major source is marine organisms. (Auth. mod.)

J-53042

Hellmer, H.H., Jacobs, S.S., **Seasonal circulation under the eastern Ross Ice Shelf, Antarctica,** *Journal of geophysical research,* June 15, 1995, 100(C6), p.10,873-10,885, 42 refs.

An annual cycle of shelf water temperatures and salinities measured at depth near the eastern Ross Ice Shelf front is used to force a two-dimensional thermohaline circulation model adapted to different sub-ice paths in the vicinity of Roosevelt I. These paths were assumed to have constant water column thicknesses of 160, 200, and 240 m and lengths of 460-800 km. Model results were compared with other long-term measurements that showed outflow from beneath the ice shelf. The ice shelf base loses mass at a rate of 18-27 cm/yr, with seasonal forcing increasing the spatial and temporal variability of circulation and property distributions in the larger cavities. Shallow cavities reduce the influence of shelf water variability with increasing length. Introducing a transient shelf water temperature rise of 0.01°C/yr for 100 years increases the melt rate by 4-5 times. (Auth. mod.)

J-53043

Hubberten, U., Lara, R.J., Kattner, G., **Refractory organic compounds in polar waters: relationship between humic substances and amino acids in the Arctic and Antarctic,** *Journal of marine research,* Jan. 1995, 53(1), p.137-149, 26 refs.

A synopsis of data on the amino acid compositions of arctic and antarctic seawater, CAD-fractions of dissolved organic matter (DOM) and suspended particulate organic material (POM) is presented. Total dissolved amino acids (TDAA) correlated highly significantly with dissolved organic nitrogen (DON), representing about 11% of DON in unfractionated filtered seawater. Average DON values were similar with ca. 3-4 μM N in the Arctic and Antarctic. Differences in amino acid distribution and composition patterns in particulate and dissolved material suggest the selective preservation or utilization of certain amino acids. In both regions, at the surface ca. 60%, and at depths >500 m almost 100% of TDAA is found in the "humic" fractions. A background value of TDAA of around 200 nM, mostly contained in the hydrophobic neutral (HbN) fraction, is present throughout the water column, probably forming part of recalcitrant molecules. The relation of these findings to different humification mechanisms is discussed. (Auth. mod.)

J-53046

Stevens, J.E., **Life in the deep freeze,** *Technology review,* May-June 1995, 98(4), p.18-20.

This paper conveys efforts of marine biologists to understand the ecology of microorganisms which inhabit sea ice in the antarctic seas, especially as correlated to ice structural phenomena compatible with biomass aggregation.

J-53130

Tanaka, K., Noguchi, K., **Oceanographic data of the 33rd Japanese Antarctic Research Expedition from November 1991 to March 1992,** *Japanese Antarctic Research Expedition. JARE data reports,* Jan. 1995, No.203, 53p.

Oceanographic activities carried out on board the icebreaker *Shirase* between Nov. 1991 and Mar. 1992 included the following: surface water sampling; XBT, CTD, and serial observations; chemical analysis of sampled water; current observations with 4 drifting buoys; and vertical current observations with XCP. Data from tidal observations carried out at Showa Station are shown in tables; hourly, daily and monthly mean sea levels from Feb. 1991 to Jan. 1992 are also presented in tables.

J-53137

Frew, R.D., Heywood, K.J., Dennis, P.F., **Oxygen isotope study of water masses in the Princess Elizabeth Trough, Antarctica,** *Marine chemistry,* Apr. 1995, 49(2-3), p.141-153, 25 refs.

Data from a hydrographic survey located in the Princess Elizabeth Trough near the antarctic continent are presented and discussed. This region is covered by sea-ice for most of the year with the ice-edge retreating to the southern edge of the Trough during summer. Water samples were collected during the austral summer, Feb. 1993, to determine the ratio of the oxygen-18 to oxygen-16 isotope, δ^{18}O. Four water bodies are characterized by their temperature, salinity and δ^{18}O properties, Surface Water, Winter Water, Warm Deep Water and Bottom Water. The Bottom

Water is warmer, saltier and heavier isotopically than Weddell Sea Bottom Water, and has T-S properties close to that of classical Antarctic Bottom Water. This Bottom Water is isotopically distinct from the Weddell Sea-derived Bottom Water that ventilates the Indian Ocean through the Kerguelen-Crozet gap. A mechanism for local formation of the Bottom Water involving freezing of Surface Water and entrainment of Warm Deep Water is described. (Auth. mod.)

J-53146

Abouchami, W., Goldstein, S.L., **Lead isotopic study of circum-antarctic manganese nodules,** *Geochimica et cosmochimica acta,* May 1995, 59(9), p.1809-1820, 55 refs.

Presented here are lead isotope ratios of Mn nodules from the circum-antarctic ocean, which links the Atlantic, Indian, and Pacific. The circum-polar antarctic was chosen for this study because of its relatively simple circulation pattern and its importance as a link between the oceans. The samples analyzed cover the whole perimeter around Antarctica, both north and south of the mean position of the Subtropical Convergence at 40°S, which represents the northern boundary of the circum-antarctic ocean. Chow and Patterson (1959, 1962) showed that the concentration of Pb in both Mn nodules and pelagic sediments is generally a factor of 10-100 higher than in continental detritus, hence the Pb is primarily derived from seawater. The primary aims of this study are to constrain the provenance of Pb in different regions of the circum-antarctic and examine the relationship between the isotope variations and general present-day ocean circulation. (Auth. mod.)

J-53194

Marshall, D., **Topographic steering of the Antarctic Circumpolar Current,** *Journal of physical oceanography,* July 1995, 25(7), p.1636-1650, 34 refs.

An analytic model of the Antarctic Circumpolar Current (ACC) is presented in which information contained in a hydrographic section is propagated along characteristics. The characteristics are obtained by assuming that potential vorticity is uniform on density surfaces, lying between the *f*/H contours found in a homogeneous ocean and the *f* contours found in a strongly stratified ocean. A family of solutions are obtained for a realistic spherical geometry including coastlines and major topographic features. In the limit of weak bottom currents, the ACC transports 160 Sv of fluid around Antarctica, with circumpolar flow in the upper 3 km and abyssal gyres bounded by the bottom topography. In the limit of large bottom currents, the ACC exhibits increased sensitivity to the topography; streamlines resemble *f*/H contours and do not pass through the Drake Passage. (Auth. mod.)

J-53198

McTaggart, A.R., Burton, H.R., Nguyen, B.C., **Emission and flux of DMS from the Australian antarctic and subantarctic oceans during the 1988/89 summer,** *Journal of atmospheric chemistry,* Jan. 1995, 20(1), p.59-69, 26 refs.

DMS (dimethyl sulfide) emissions and fluxes from the Australasian sector of the antarctic and subantarctic oceans were determined from a limited number of samples collected during three summer resupply voyages to Australian antarctic continental research bases between Nov. 1988 and Jan. 1989. The maximum DMS emission from this sector of the antarctic ocean was in an area near the Antarctic Divergence, while the minimum DMS emission was from the antarctic coastal and offshelf waters. The greatest emission of DMS from this sector of the southern ocean was from subantarctic waters. The flux of DMS from the Australasian sector of the subantarctic ocean was probably twice the flux of DMS from the adjacent antarctic ocean. (Auth. mod.)

J-53250

Rosenthal, Y., Boyle, E.A., Labeyrie, L.D., Oppo, D., **Glacial enrichments of authigenic Cd and U in subantarctic sediments: a climatic control on the elements' oceanic budget?,** *Paleoceanography,* June 1995, 10(3), p.395-413, 73 refs.

Examined here is the possibility that glacial increase in the areal extent of reducing sediments might have changed the oceanic Cd inventory, thereby decoupling Cd from PO_4. It is suggested that the precipitation of Cd-sulfide in suboxic sediments is the single largest sink in the oceanic Cd budget and that the accumulation of authigenic Cd and U is tightly coupled to the organic carbon flux into the seafloor. Sediments from the subantarctic ocean and the Cape Basin (South Atlantic), where oxic conditions currently prevail, show high accumulation rates of authigenic Cd and U during glacial intervals associated with increased accumulation of organic carbon. These elemental enrichments attest to more reducing conditions in glacial sediments in response to an increased flux of organic carbon. A third core shows an approximately inverse pattern to the subantarctic record. The contrasting patterns to the north and south of the Antarctic Polar Front suggest that higher accumulation rates of Cd and U in subantarctic sediments were driven primarily by increased productivity. (Auth. mod.)

J-53276

Shopova, D., Dehairs, F., Baeyens, W., **Simple model of biogeochemical element distribution in the oceanic water column,** *Journal of marine systems,* June 1995, 6(4), p.331-344, 40 refs.

A simple technique for data analysis of the distribution of biogeochemical elements in the oceanic water column is presented. It is based on a steady vertical model, which assumes that the turbulent diffusion and vertical advection are the main physical mechanisms influencing the conservative tracer concentration. The production/consumption rates of non-conservative tracers are computed on the basis of this model. Sensitivity analysis of the model has been performed, which permits assessing the eventual influence of horizontal advection on the results. It also permits the taking into account of its effects if some hypothesis for the horizontal gradients is made. The potential area of applicability for data analysis is broad. Examples of its application are presented as analysis of oxygen data for some stations of the INDIGO3, 1987 expedition in the southern ocean. The calculated oxygen consumption rates for the Antarctic Circumpolar Current (Indian Ocean Sector) range between 1.8 and 2.22 mmol/m^2/d±20%. (Auth.)

J-53278

Singer, A.J., Shemesh, A., **Climatically linked carbon isotope variation during the past 430,000 years in southern ocean sediments,** *Paleoceanography,* Apr. 1995, 10(2), p.171-177, 43 refs.

The isotopic composition of carbon from organic matter enclosed within diatom frustules is used as a proxy for paleoproductivity and paleodissolved carbon dioxide concentrations in ocean surface waters. A southern ocean record from south of the Antarctic Polar Front and spanning 430,000 years of carbon isotopic variation in diatomaceous organic matter is presented for the first time. The most refractory diatomaceous organic matter fraction was extracted and analyzed to avoid problems associated with diagenesis. The results clearly indicate cyclic changes in organic carbon isotopic ratios, with ^{13}C depleted values associated with all of the last five glacial periods, reflecting changes in surface water properties and primary productivity. Changes in dissolved carbon dioxide concentrations are the most probable cause of these cycles, but the possible effect of seawater pH changes cannot be excluded. (Auth.)

J-53279

Shemesh, A., Burckle, L.H., Hays, J.D., **Late Pleistocene oxygen isotope records of biogenic silica from the Atlantic Sector of the southern ocean,** *Paleoceanography,* Apr. 1995, 10(2), p.179-196, 23 refs.

Analytical reproducibility and core-to-core consistency of the isotopic signal suggests that diatom $\delta^{18}O$ can be used as a new paleoceanographic tool to reconstruct past variations in surface water characteristics and to generate ^{18}O-isotope-based stratigraphy for the southern ocean. Diatom $\delta^{18}O$ reflects sea surface temperature and seawater isotopic composition; diatoms retain their isotopic signal on timescales of at least 430 ka. The $\delta^{18}O$ analyses of different diatom assemblages reveal that the isotopic signal is free of species effects and that common antarctic species have the same water-opal fractionation. The transition from the last glacial maximum (LGM) to the Holocene is fully recorded in high sedimentation rate cores. (Auth. mod.)

J-53280

Mead, G.A., Hodell, D.A., **Controls on the $^{87}Sr/^{86}Sr$ composition of seawater from the middle Eocene to Oligocene: Hole 689B, Maud Rise, Antarctica,** *Paleoceanography,* Apr. 1995, 10(2), p.327-346, 85 refs.

A $^{87}Sr/^{86}Sr$ isotope curve of the middle Eocene to Oligocene was produced from analysis of foraminifera in Ocean Drilling Program Hole 689B, Maud Rise, near the coast of Antarctica. Sediments from the hole are well preserved with no evidence of diagenetic alteration. The sequence is nearly complete from 46.3 to 24.8 Ma, with an average sampling interval of 166 kyr. Marine strontium isotopic ratios were nearly stable from 46.3 to 35.5 Ma. The slope remained constant at least until 24.8 Ma, when the record becomes discontinuous owing to unconformities. Several possible controls on the marine strontium isotope curve are evaluated that could have led to the observed growth in $^{87}Sr/^{86}Sr$ ratios near the Eocene/Oligocene boundary, including the onset of antarctic glaciation, increased mountain building in the Himalayan-Tibetan region, and decreased hydrothermal activity. A combination of causes, such as decreased hydrothermal activity perhaps followed by increased glaciation and mountain building, might best explain the growth of the marine $^{87}Sr/^{86}Sr$ curve during the Oligocene. (Auth. mod.)

J-53305

Grose, T.J., Johnson, J.A., Bigg, G.R., **Comparison between the FRAM (Fine Resolution Antarctic Model) results and observations in the Drake Passage,** *Deep-sea research, Part I,* Mar. 1995, 42(3), p.365-388, 34 refs.

The velocity and density fields generated by the Fine Resolution Antarctic Model (FRAM) are compared with observations made in the neighborhood of the Drake Passage. Detailed comparisons are presented for the jets along the Subantarctic Front, the Polar Front and the Continental Water Boundary. As the position of the Antarctic Circumpolar Current is mainly topographically controlled, the consequences of smoothing the topography in numerical models are discussed. The transport through the Drake Passage in FRAM is about 180 Sv, about 50 Sv higher than the most recent observations. Reasons for this discrepancy between observations and primitive equation models are discussed. The smoothed topography has forced the Polar Front to divide and merge with the Subantarctic Front and the Continental Water Boundary Front, but cold core current rings are still shed from the Polar Front meander as in the observations. (Auth.)

J-53307

Toggweiler, J.R., Samuels, B., **Effect of Drake Passage on the global thermohaline circulation,** *Deep-sea research, Part I,* Apr. 1995, 42(4), p.477-500, 38 refs.

The Ekman divergence around Antarctica raises a large amount of deep water to the ocean's surface. The regional Ekman transport moves the upwelled deep water northward out of the circumpolar zone. The divergence and northward surface drift combine, in effect, to remove deep water from the interior of the ocean. This wind-driven removal process is facilitated by a unique dynamic constraint operating in the latitude band containing Drake Passage. A simple model sensitivity experiment shows that the upwelling and removal of deep water in the circumpolar belt may be quantitatively related to the formation of new deep water in the northern North Atlantic. These results show that stronger winds in the south can induce more deep water formation in the north and more deep outflow through the South Atlantic. The fact that winds in the Southern Hemisphere might influence the formation of deep water in the North Atlantic brings into question long-standing notions about the forces that drive the ocean's thermohaline circulation. (Auth.)

J-53308

Foster, T.D., **Abyssal water mass formation off the eastern Wilkes Land coast of Antarctica,** *Deep-sea research, Part I,* Apr. 1995, 42(4), p.501-522, 21 refs.

The area off the eastern Wilkes Land coast between 147 and 162°E has been investigated as a site for the formation of bottom and deep water using seven hydrographic sections obtained in the austral summer 1985. The sections showed that there was high salinity water near the freezing point upon the continental shelf in this region. The deeper shelf water was potentially more dense than the water off the shelf, but a reversely sloping shelf and the Coriolis effect constrain this water from flowing off continuously. Since the sections are very similar to those found in the southern Weddell Sea, it is proposed that the same mechanisms that are probably responsible for shelf-break mixing and bottom water formation in the Weddell Sea also take place here. Most of the water on the shelf above the shelf-break sill depth, while not dense enough to form true bottom water, potentially could mix with the Warm Deep Water and interleave with water off the shelf at intermediate and near-bottom depths. Thus this region may contribute to what is commonly denoted as Antarctic Bottom Water as effectively on an areal basis as the shelf-break region of the Weddell Sea. (Auth.)

J-53322

Barrera, E., **Global environmental changes preceding the Cretaceous-Tertiary boundary: early-late Maastrichtian transition,** *Geology,* Oct. 1994, 22(10), p.877-880, 22 refs.

Stable carbon, oxygen, and strontium isotope data from Maastrichtian planktic and benthic foraminifera from southern high-latitude Ocean Drilling Program Sites 690, 750, and 761 reveal major changes in climate and ocean chemistry during the early to late Maastrichtian transition, some 4 to 6 m.y. prior to the Cretaceous-Tertiary (K-T) boundary. The $\delta^{18}O$ results suggest accelerated cooling, resulting in the lowest marine temperatures of the Late Cretaceous. The late Maastrichtian rise in the seawater $^{87}Sr/^{86}Sr$ ratio begins at the time of this change and suggests increased rates of continental weathering and/or runoff. The $\delta^{13}C$ values show a negative shift of ≈ 0.5 per mill followed by a positive shift of ≈ 1 per mill. The $\delta^{13}C$ fluctuations may reflect change in deep water chemistry with cooling, variation in reduced carbon storage in coastal areas caused by eustatic sea-level fluctuation, and increased surface-water productivity. These findings contradict the common representation of stable and climatically equable environmental conditions in the latest Cretaceous before the K-T boundary event. (Auth.)

J-53346

German, C.R., Masuzawa, T., Greaves, M.J., Elderfield, H., Edmond, J.M., **Dissolved rare earth elements in the southern ocean: Cerium oxidation and the influence of hydrography,** *Geochimica et cosmochimica acta,* Apr. 1995, 59(8), p.1551-1558, 28 refs.

Analysis of dissolved REE distributions in the southeastern Atlantic Ocean has revealed that progressive oxidative removal of dissolved Ce from deepwater (>1 km) occurs over the mixing time of the oceans. Ce-anomaly (Ce/Ce*) values measured in deep waters from the southeastern Atlantic are similar to, but slightly higher than, those from deep-ocean stations throughout the Indian and Pacific oceans, typically falling in the range $0.08 \leq Ce/Ce^* \leq 0.12$. Only deepwater samples from the North Atlantic exhibit values greater than $Ce/Ce^* \approx 0.12$, with the exception of southeastern Atlantic bottom water which are influenced by Antarctic Bottom Water (AABW). Covariation of dissolved REE concentrations with salinity and/or dissolved Si concentrations at this site has allowed dissolved REE compositions for various southern ocean water masses to be predicted. End-member concentrations for AABW derived in this way indicate high dissolved REE concentrations, similar to average Pacific Deep Water, but with significantly enhanced dissolved Ce concentrations and less pronounced HREE enrichment. This result is consistent with the proximity of the study site to active AABW deepwater formation and evolution of that water mass during transport to the Pacific Ocean. (Auth.)

J-53371

Szeliga, J., Rakusa-Suszczewski, S., **Morphometry of Bransfield Strait, West Antarctica,** *Polish polar research,* 1994, 15(1-2), p.21-29, With Polish summary. 3 refs.

On the basis of approx. 12,500 depth measurements of which 6700 were taken from R/V *Profesor Siedlecki,* 1300 from R/V *Polarstern* and the remainder from British navigation charts, a bathymetric chart of the Bransfield Strait in the scale 1:500,000 has been prepared. Within the assumed boundaries the total area of the Bransfield Strait covers 65,308.6 sq km, of which the Western Basin covers 23.5%, Central Basin, 47.3%, and Eastern Basin, 29.2%. Capacity of the entire Bransfield Strait amounts to 38,451 km^3. The average depth of the Bransfield Strait is 592 m. (Auth. mod.)

J-53387

Acosta, J., Herranz, P., Sanz, J.L., Uchupi, E., **Antarctic continental margin: geologic image of the Bransfield Trough, an incipient ocean basin,** Geologic evolution of Atlantic continental rises, edited by C.W. Poag and P.C. de Graciansky, New York, Van Nostrand Reinhold, 1992, p.49-61, 32 refs.

DLC QE350.2.G45 1992

Seismic reflection profiles from this study and data obtained during previous studies indicate that the Bransfield Trough is a continental rift structure in transition to becoming an oceanic one. The asymmetry of the trough suggests that it is a half-graben structure, whose master fault is on the Antarctic Peninsula side, away from the zone of subduction. The fault is opposed by a platform, the South Shetland Is. Ridge. This tectonic model, however, needs verification. At present, the spreading axis in the Bransfield Trough consists of discrete igneous centers separated by gaps that may have allowed sediments from Antarctica to reach the northwest side of the trough. Continuity of the axis also is interrupted by structures aligned transversely to the trough axis. The intersection of these cross-structures with features parallel to the trough axis appears to be sites of pronounced magmatic activity. If the 30 km-wide Bransfield Trough is representative of conditions that exist when deposition changes from synrift to drift (postrift), then the authors can make some inferences regarding the analogous Jurassic/Cretaceous transitions in the North and South Atlantic. Above all, data show that the transition from rift to drift may be commonly marked by a complex distribution of synrift and postrift lithofacies. (Auth. mod.)

J-53431

Döös, K., **Interocean exchange of water masses,** *Journal of geophysical research,* July 15, 1995, 100(C7), p.13,499-14,514, 13 refs.

A new method for calculating water mass transport between different ocean basins from the velocity fields obtained by numerical models is presented. The method is applied to the velocity field of the southern ocean simulated by a primitive equation model (Fine Resolution Antarctic Model). With this model it is possible to judge whether a water mass has been ventilated or not, to estimate how many times it has circled around Antarctica, and to calculate the time it has spent in the southern ocean. Calculations have also been undertaken revealing to what extent the changes of temperature, salinity, and density have been caused by mixing and by ventilation. Two major ways to redistribute the water through the southern ocean are identified. The first one redistributes 53% of the water and involves an unventilated direct exchange between the oceans; the second one redistributes 33% by going around Antarctica. It is found that, on average, the water mass makes six circuits before the water is ventilated and subsequently driven north by the Ekman transport. (Auth. mod.)

J-53433

Gordon, A.L., Huber, B.A., **Warm Weddell Deep Water west of Maud Rise,** *Journal of geophysical research,* July 15, 1995, 100(C7), p.13,747-13,753, 15 refs.

A pool of relatively warm (>1.0°C) Weddell Deep Water (WDW) immediately west of Maud Rise appears to be a quasi-stationary feature. The "warm pool" is derived from the flow of warm WDW around the flanks of Maud Rise. An austral spring 1989 expedition of the R/V *Akademik Fedorov* obtained detailed measurements of this warm pool. It displays the general regional relationship of temperature maximum warmth to shallowness of the pycnocline, as well as mixed layer oxygen concentration well below full saturation. Depression of oxygen values is a product of injection of WDW into the mixed layer during the ice-covered winter period. Associated with this transfer are high vertical fluxes of heat and salt which limit the thickness of the sea ice cover. In the winter the atmosphere is sufficiently cold to remove the WDW heat without massive sea ice melting, though the regional ice thickness is restricted. In the spring the atmospheric conditions cannot remove the ocean heat, and ice melting ensues before the atmospheric heat budget alone can account for the ice melt. This is clearly seen in the warm pool as very low mixed layer oxygen, which is a reflection of high WDW entrainment and vertical heat flux and is normally associated with high mixed layer salinity. (Auth. mod.)

J-53458

Imbrie, J., et al, **On the structure and origin of major glaciation cycles. 1. Linear response to Milankovitch forcing,** *Paleoceanography,* Dec. 1992, 7(6), p.701-738, Refs. p.733-738.

Time series of ocean properties provide a measure of global ice volume and monitor key features of the wind-driven and density-driven circulations over the past 400,000 years. Cycles with periods near 23,000, 41,000, and 100,000 years dominate this climatic narrative. When the narrative is examined in a geographic array of time series, the phase of each climatic oscillation is seen to progress through the system in essentially the same geographic sequence in all three cycles. This paper maintains that the 23,000- and 41,000-year cycles of glaciation are continuous, linear responses to orbitally driven changes in the arctic radiation budget, and uses the phase progression in each climatic cycle to identify the main pathways along which the initial local responses to radiation are propagated by the atmosphere and ocean. (Auth. mod.)

J-53517

Monod, J.L., Arnaud, P.M., Arnoux, A., **PCB congeners in the marine biota of Saint Paul and Amsterdam Islands, southern Indian Ocean,** *Marine pollution bulletin,* Apr. 1995, 30(4), p.272-274, 9 refs.

The PCB and DDT pollution of subantarctic environments and of the biota of the southern Indian Ocean has been the subject of only a few papers. These involve either samples taken near Marion I., the Kerguelen Is., or along a transect between Showa Station and Mauritius I. For the subtropical zone located between the subantarctic and the subtropical convergences, the only data available are those of Tanabe et al. (1983). The present paper partly fills this gap by providing data on the levels of the six PCB congeners 28, 52, 118, 138, 153 and 180 in various biological samples from Saint Paul and Amsterdam islands. I.).

J-53536

Niebler, H.S., **Reconstruction of paleoenvironmental parameters using stable isotopes and faunal assemblages of planktonic foraminifera in the South Atlantic Ocean** [Rekonstrucktionen von Paläo-Umweltparametern anhand von stabilen Isotopen und Faunen-Vergesellschaftungen planktischer Foraminiferen im Südatlantik], *Berichte zur Polarforschung,* July 1995, No.167, 198p., In German with English summary. Refs. p.128-141. The work is the author's dissertation submitted to the University of Bremen in 1994.

Changes in surface water hydrography in the southern ocean (eastern Atlantic sector) are reconstructed on the basis of isotope-geochemical and micropaleontological studies. A total of 75 high quality multicorer sediment surface samples from the southern South Atlantic Ocean and three Quaternary sediment cores, taken on a meridional transect across the Antarctic Circumpolar Current, were investigated. The reconstruction of environmental parameters indicates only small changes in the position of the frontal systems in the eastern sector of the Antarctic Circumpolar Current during the last 140,000 years. The average position of the Subtropical Front and Subantarctic Front shifted approximately three latitudes between interglacials and glacials. The Antarctic Polar Front shifted approximately four latitudes. Substantial modifications of this scenario have been interpreted for the reconstruction of cold sea-surface temperatures at 41°S during the oxygen isotope stages 16 and 14 to 12. During these times the Subtropical Front was probably shifted up to seven latitudes northwards. (Auth. mod.)

J-53540

Argentine Oceanographic Data Center, **Responsible National Oceanographic Data Center for the Southern Oceans (RNODC/SOC): annual report, 1992,** Buenos Aires, [1993], 56p., In Spanish and English.

With this 5th annual report, RNODC/SOC provides data entered in its Master File during 1992, describing the available data, the Center's current and planned activities and its policy for data and information exchange. Tables and charts include master catalogues for a total of 294 ocean cruises; ocean station inventories, by month and country; summer and winter station plots; the Master File design; and country and ship codes.

J-53548

Kennicutt, M.C., II, et al, **Human contamination of the marine environment—Arthur Harbor and McMurdo Sound, Antarctica,** *Environmental science & technology,* May 1995, 29(5), p.1279-1287, 31 refs.

Polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCBs), pesticides, and trace metal concentrations in McMurdo Sound and Arthur Harbor sediments and marine biota are reported. Biomarkers of contaminant exposure, biliary metabolites and EROD assays were also measured. Hydrocarbon and trace metal contamination are generally limited to within hundreds of meters of human settlements. Local releases of fossil fuels, disposal of waste materials, and aging of ship and station structures contribute to contamination. High concentrations of PCBs were detected in sediments (250-4200 ng/g) and organisms (up to 420 ng/g) from Winter Quarters Bay (WQB). Trace metal and PAH sediment concentrations rarely exceed levels known to cause toxic effects in marine organisms, whereas PCBs in WQB often do. Biological responses to exposure include the formation of PAH metabolites and the inducement of the P4501A detoxification system in fish. Induction of EROD activity in *in vitro* rat hepatoma H411E cell bioassays by tissue extracts correlated with known levels of PCB contamination in invertebrate tissues. Local sources of contaminants greatly exceed those attributable to long-distance atmospheric transport. (Auth.)

J-53626

Toggweiler, J.R., Samuels, B., **Effect of sea ice on the salinity of antarctic bottom waters,** *Journal of physical oceanography,* Sep. 1995, 25(9), p.1980-1997, Refs. p.1996-1997.

Brine rejection during the formation of antarctic sea ice is known to enhance the salinity of dense shelf waters in the Weddell and Ross seas. As these shelf waters flow off the shelves and descend to the bottom, they entrain ambient deep water to create new bottom water. It is not uncommon for ocean modelers to modify salinity boundary conditions around Antarctica in an attempt to include a "sea ice effect" in their models. However, the degree to which antarctic salinities are enhanced is usually not quantified or defended. In this paper, studies of shelf hydrography and $\delta^{18}O$ are reviewed to assess the level of salinity enhancement appropriate for ocean general circulation models. The relevant quantities are: the salinity difference between the water masses modified on the shelves and the final offshelf flow, and the flux of salt (or freshwater) that gives rise to this salinity difference. Onshelf/offshelf salinity changes in the Weddell and Ross seas appear to be fairly small, 0.15-0.20 salinity units. The quantity of brine needed to produce this salinification is equivalent to the salt drained from <0.50 m of new sea ice every year. The authors conclude that salt from sea ice is probably not a major influence on the salinity of antarctic bottom waters. (Auth. mod.)

J-53627

Pierce, D.W., Barnett, T.P., Mikolajewicz, U., **Competing roles of heat and freshwater flux in forcing thermohaline oscillations,** *Journal of physical oceanography,* Sep. 1995, 25(9), p.2046-2064, Refs. p.2063-2064.

The physical mechanisms causing century-scale southern ocean thermohaline oscillations in a primitive equation oceanic general circulation model are described. The oscillations have been shown to occur on a 320 year timescale when random fluctuations are added to the freshwater flux field that forces the model; this result is extended to show that they occur in a variety of situations, including ones without added noise. The oscillations involve movement between two model states: one characterized by strong convection and an active thermohaline circulation, and the other with a halocline around Antarctica capping off the water column, thus preventing convection. The physical mechanism that forces the model from the quiescent state to an actively convecting one is subsurface (300 m) heating around Antarctica, which destabilizes the water column; the ultimate source of this heat is advected North Atlantic Deep Water. This leads to a teleconnection between forcing conditions in the North Atlantic and the thermohaline structure of the southern ocean. The mechanism that shuts off convection is surface freshening, primarily by precipitation, in the region poleward of the Antarctic Circumpolar Current. (Auth. mod.)

J-53628

Guretskiĭ, V.V., Danilov, A.I., Shtammer, D., **Movement of eddies of the Antarctic Circumpolar Current at the eastern boundary of the Weddell Gyre, as indicated by satellite altimetry,** *Russian Academy of Sciences. Transactions. Earth science sections,* 1992 (Pub. Sep. 1994), 325A(6), p.228-232, Translated from Rossiĭskaia Akademiia Nauk. Doklady. For Russian original see 49-1369 or J-51654. 10 refs.

Heat and salt are carried into the antarctic zone of the southern ocean (south of the Antarctic Polar Front) by Circumpolar Water down to 200 to 3000 m depth. Eddy structures generated on the southern periphery of the Antarctic Circumpolar Current are likely to make a major contribution to the development of meridional transport of temperature and salinity characteristics, feeding the Circumpolar Water and affecting the distribution of drifting ice. (Auth. mod.)

J-53645

Power, S.B., **Climate drift in a global ocean general circulation model,** *Journal of physical oceanography,* June 1995, 25(6), p.1025-1036, 53 refs.

A global version of the GFDL modular ocean model is forced using conventional restoring boundary conditions (BCs), mixed BCs (i.e., restoring the upper-level temperature but specifying a fixed salt flux), and stochastic fluxes of both heat and freshwater. The climatology of the model drifts if stochastic freshwater fluxes are applied at high latitudes under mixed BCs. The drift is global in extent: the ocean is generally warmer in the North Pacific and Weddell Sea but cooler and fresher at depths elsewhere in the southern ocean and in the North Atlantic. There is a slight reduction (by about 5%) in the meridional overturning of the southern ocean and the North Atlantic. The drift of the barotropic flow is most pronounced in the southern ocean and is associated with a permanent meandering of the Antarctic Circumpolar Current. The drift occurs within a few decades, suggesting that it may be important in enhanced greenhouse scenarios for early next century that have been obtained using coupled atmosphere-ocean GCMs. (Auth. mod.)

J-53647

Hughes, T.M.C., Weaver, A.J., **Multiple equilibria of an asymmetric two-basin ocean model,** *Journal of physical oceanography,* Mar. 1994, 24(3), p.619-637, 42 refs.

An ocean general circulation model is used to examine the role of model geometry and surface buoyancy and wind stress forcing in the asymmetry of the global thermohaline circulation. The model domain is a highly idealized Atlantic and Pacific, linked by a circumpolar ocean in the south. The integrations are performed under mixed boundary conditions diagnosed from spinups under various temperature and salinity profiles constructed from present-day climatology. The model exhibits a tendency to favor either a "conveyor"-type circulation with sinking in the northern North Atlantic and upwelling in the North Pacific, or a "southern sinking" state with deep sinking in the Antarctic only. Equilibria with northern sinking in both basins can appear, however, when the winds in the southern ocean are reduced or the horizontal or vertical mixing in that region is tampered with. Three alternate two-basin geometries also have both "northern sinking" and "inverse conveyor" solutions. The common characteristic of all the North Pacific sinking states is the appearance of a very fresh halocline in the southern ocean that strongly reduces the Antarctic Circumpolar Current and reverses the sign of the normal pole-to-pole surface density contrast in the Pacific. (Auth. mod.)

J-53655

Muench, R.D., Gordon, A.L., **Circulation and transport of water along the western Weddell Sea margin,** *Journal of geophysical research,* Sep. 15, 1995, 100(C9), p.18,503-18,515, 27 refs.

Ocean current, temperature and salinity data obtained from the western Weddell Sea during the austral winter 1992 U.S.-Russian drifting ice station experiment Ice Station Weddell 1 are used to describe water circulation and transport. Surface-to-bottom baroclinic currents were computed by applying the geostrophic approximation to derived density data. These were corrected using current measurements obtained from drifting current meter arrays, and the resulting total currents were vertically integrated to obtain volume transports. Transport was found to be northward in the region, which encompassed the western boundary current of the cyclonic Weddell Sea gyre. This northward transport increased from south to north by more than a factor of 2. The increase in northward transport was compensated for by westward flow from the interior of the gyre into the western boundary region. A thick bottom layer of cold water was identifiable by its water mass characteristics as Weddell Sea Bottom Water originating on the southwestern and western shelf regions. Its north flowing volume was consistent with past estimates of a 1.5-2 x 10^6 m^3/s production rate coupled with a 300-400% transport increase due to entrainment during downslope flow from the shelves to the deep basin. (Auth. mod.)

J-53656

Robertson, R., Padman, L., Levine, M.D., **Fine structure, microstructure, and vertical mixing processes in the upper ocean in the western Weddell Sea,** *Journal of geophysical research,* Sep. 15, 1995, 100(C9), p.18,517-18,535, 50 refs.

The upward flux of heat from the subsurface core of Warm Deep Water (WDW) to the perennially ice-covered sea surface over the continental slope in the western Weddell Sea is estimated using data obtained during Feb.-June 1992 from a drifting ice station. The diapycnal heat flux is estimated to be about 3 W/m^2, predominantly because of double-diffusive convection. The estimated mean rate of heat transfer from the mixed layer to the ice is 1.7 W/m^2. It is hypothesized that isopycnal mixing along sloping intrusions also contributes to the loss of heat from the WDW in this region. Intrusions occur intermittently throughout this experiment but are most commonly found near the boundary of the warm-core current and the shelf-modified water to the east. These heat fluxes are significantly lower than the basin-averaged value of 19 W/m^2 that is required to balance the heat budget of the Weddell Gyre. (Auth. mod.)

J-53657

Boddem, J., Schlitzer, R., **Interocean exchange and meridional mass and heat fluxes in the South Atlantic,** *Journal of geophysical research,* Aug. 15, 1995, 100(C8), p.15,821-15,834, 31 refs.

The purpose of the present study is to investigate the time mean circulation in the South Atlantic and to address the controversy on possible flow patterns and transport rates. As a tool, the model approach of Sehlitzer [1993] is used. The historical database of temperature and salinity measurements (more than 15,000 stations in the South Atlantic) is exploited and an optimal steady state model circulation is sought that is consistent with geostrophic shear calculations and is able to reproduce the measured temperature and salinity distributions. Model setup and strategy are described, then it is shown that a steady flow field with mainly geostrophic velocity shear and realistic model θ and s distributions can actually be found. Model calculations with additional *a priori* volume and heat flux constraints show that the overall model objectives can be met by a variety of significantly different circulation patterns. These alternative model solutions are also presented. (Auth. mod.)

J-53658

Vogeler, A., Schröter, J., **Assimilation of satellite altimeter data into an open ocean model,** *Journal of geophysical research,* Aug. 15, 1995, 100(C8), p.15,951-15,963, 35 refs.

Geosat sea-surface height data are assimilated into an eddy-resolving quasi-geostrophic open ocean model using the adjoint technique. The method adjusts the initial conditions for all layers and is successful on a timescale of a few weeks. Time-varying values for the open boundaries are prescribed by a much larger quasi-geostrophic model of the Antarctic Circumpolar Current (ACC). Both models have the same resolution, have three layers, and include realistic bottom topography and coastlines. The open model box is embedded in the African sector of the ACC. These results are used for the adjoint optimization procedure as boundary conditions and as a first guess for the initial condition. Several experiments which attempt to improve the convergence of the iterative optimization method are reported. (Auth. mod.)

J-53709

Fahrbach, E., Rohardt, G., Scheele, N., Schröder, M., Strass, V., Wisotzki, A., **Formation and discharge of deep and bottom water in the northwestern Weddell Sea,** *Journal of marine research,* July 1995, 53(4), p.515-538, 38 refs.

Deep and bottom water formation in the Weddell Sea is the major source of the bottom water of the world ocean. Measurements made in the northwestern Weddell Sea between 1989 and 1993 during the Weddell Gyre Study indicate that the outflow of young bottom water with the western boundary current of the Weddell Gyre is dominated by a rather fresh water mass which obtains its thermohaline characteristics by mixing of deep water with a flow from the shelf in front of the Larsen Ice Shelf. The more saline source water mass, which is necessary to maintain the thermohaline properties of the Weddell Sea Deep Water, is less prominent in the bottom water outflow. The transport of bottom water with the western boundary current of the Weddell Gyre ranges from 1 to $4x10^6$ m^3/s. The outflow is subject to a seasonal cycle with minimum temperatures and maximum velocities in early austral winter. (Auth.)

J-53719

Frew, R.D., **Antarctic bottom water formation and the global cadmium to phosphorus relationship,** *Geophysical research letters,* Sep. 1, 1995, 22(17), p.2349-2352, 25 refs.

Near-surface waters close to the antarctic continent are found to have high cadmium concentrations relative to phosphorus. These waters have been shown to be the major component in the local formation of Antarctic Bottom Water in this region. It is demonstrated that Antarctic Bottom Water so formed would have a high preformed cadmium-to-phosphorus ratio. The ventilation of the abyssal ocean with this water would contribute to the observed kink in the global cadmium-to-phosphorus relationship. This is an important conclusion for paleochemical studies and may account for part of the discrepancy between cadmium and carbon-13 paleochemical tracers observed in the southern ocean. (Auth. mod.)

J-53726

Arzhanova, N.V., Zubarevich, V.L., Naletova, I.A., **Forms of occurrence of nitrogen in the Southern Atlantic,** *Oceanology,* 1990 (Pub. June 1991), 30(6), p.690-695, Translated from Okeanologiia. 6 refs.

DLC GC1.O3913

The lateral distribution of mineral and organic nitrogen and their ratios in the water column in the latitude zones of the South Atlantic Ocean are discussed. Total mineral nitrogen decreases greatly from the Antarctic to the equator (from 15-30 to 1 µg-atom/l in the euphotic zone), but organic nitrogen remains at essentially the same level in all water types. High levels of organic nitrogen (greater than, respectively, 30 and 20 µg-atom/l) at the surface and in the depths) occur in regions of downwelling (the Antarctic Convergence zone and the tropical anticyclone). The contributions of urea nitrogen and amino acid nitrogen to total organic nitrogen vary greatly, from 5% to 30% and 20%, respectively, indicating a change in the character of organic matter in the water column. (Auth.)

J-53756

Burkov, V.A., **Antarctic jets,** *Oceanology,* Mar.-Apr. 1994, 34(2), p.145-153, Translated from Okeanologiia. 20 refs.

Jets of the Antarctic Circumpolar Current (ACC) corresponding to the subantarctic (SAF) and polar (PF) fronts, and two jets within the antarctic zone (AZ) are investigated along 13 meridional sections along the AZZ. These jets are steady individual structures with maximum speeds in sections perpendicular to the ACC. The jets are separated by bands of very low speeds. The morphometric and kinematic characteristics of jets are given. It is hypothesized that formation of SAF and PF jets is caused by seasonal longitudinal displacement of the western wind maximum over the southern ocean. (Auth. mod.)

J-53757

Shapiro, G.I., Emel'ianov, M.V., **Relationship between characteristics of the mesoscale and the fine structure in the antarctic polar front zone,** *Oceanology,* Mar.-Apr. 1994, 34(2), p.180-185, Translated from Okeanologiia. 13 refs.

The mesoscale and fine structure of the thermohaline field in the frontal zone north of South Georgia I. are investigated. The parameters of the main fronts, meanders and isolated cold patches are determined. Absolute and relative mesoscale characteristics of the polar front zone (PFZ) are analyzed and their relations with fine structure parameters are revealed. A method of quasispectral analysis of thermohaline fine structure is proposed. This method makes it possible to calculate the thickness of the layer of vertical movements and the intensity of diapycnal and isopycnal mixing. It is shown that the weak stratification of the antarctic waters to the south of the PFZ corresponds to the intensity of diapycnal processes. (Auth. mod.)

J-53759

Voronina, N.M., ed, **Pelagic ecosystems of the southern ocean: collected scientific papers** [Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov], Moscow, Nauka, 1993, 270p., In Russian. Refs. passim. For individual papers see A-53788, A-53790, A-53792 through A-53795, B-53770, B-53776, B-53777, B-53779, B-53781 through B-53787, B-53789, B-53791, B-53796, B-53798 through B-53805, F-53797, J-53760 through J-53769, J-53771 through J-53775, J-53778, and J-53780.

DLC QH84.2.P45

Results of investigations on ecological, hydrological and hydrochemical water structure properties of the southern ocean are reported. The papers are grouped under the following subtitles: oceanographic features responsible for the distribution, state and variability of the pelagic communities; ecology of plankton populations and groups; seasonal succession in the antarctic and subantarctic communities; and production of some planktonic groups and trophic relationships in the pelagic ocean. A review by the editor of antarctic pelagic investigations with reference to literature data (25 references) concludes this volume.

J-53760

Burkov, V.A., **New hydrological features of the southern ocean** [Novye cherty gidrologii IUzhnogo okeana], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.5-19, In Russian. 31 refs.

DLC QH84.2.P45

After defining the borders and zonation of the southern ocean, the discussion covers the structure of the Antarctic Circumpolar Current (ACC) and its connection to the antarctic fronts, the variations of its barotrophic discharges, the influence of bottom topography on the direction of the ACC flow, the development of maximum vortex activity over the Current's underwater obstacles, and synoptic meanderings and the formation of individual eddies on a synoptic scale.

J-53761

Guretskiĭ, V.V., Danilov, A.I., **Distribution of circumpolar waters in the Weddell Gyre from POLEX-South-88 data** [O rasprostranenii vod tsirkumpoliarnogo proiskhozhdeniia v predely krugovorota Ueddella (po rezul'tatam ekspeditsii POLEKS-IUg-88)], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.19-26, In Russian. 9 refs.

DLC QH84.2.P45

Data obtained by the POLEX-South-88 expedition in eastern and western portions of the Weddell Gyre frontal zones, on the role of vortex formation in processes of meridional interchange in the antarctic zone of the southern ocean show that, due to weak stratification of antarctic waters, vortex intensity is less pronounced in that region than in lower latitudes.

J-53762

Danilov, A.I., Guretskiĭ, V.V., **Macro-scale structure of the Weddell Gyre** [Krupnomashtabnaia struktura krugovorota Ueddella], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.26-39, In Russian. 21 refs.

DLC QH84.2.P45

Ocean surface and deep water salinity and temperature fields and their seasonal variations and circulation were constructed for the area of 50°S, from the Antarctic Peninsula to 40°E. At the northeastern border of the Weddell Gyre, the highest temperature values are found at 500 m depth, while in the central portion of the Gyre they are found at depths <300 m. At the southwestern border of the Gyre a water temperature of 0.2-0.4° is found at 700 m depth. Graphs of the Gyre's barotropic circulation, temperature and salinity distribution at different water depths are presented. The data show that the Weddell Gyre is a single circulatory system.

J-53763

Belkin, I.M., **Frontal structure of the South Atlantic Ocean** [Frontal'naia struktura IUzhnoĭ Atlantiki], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.40-53, In Russian. 80 refs.

DLC QH84.2.P45

Three main circumpolar fronts—Polar, Subantarctic and Subtropical, flowing in easterly direction—are described and shown on graphs. A review is presented of the data obtained by various authors regarding the horizontal structure of the currents and their zonation and surface characteristics, such as salinity and temperature. The data are also shown in tables.

J-53764

Emel'ianov, M.V., **Dependence of the fine thermohaline type of water structure in the Antarctic Convergence on the thermoclinicity degree of the frontal interface** [Vzaimosviaz' tipa tonkoĭ termokhalinnoĭ struktury vod Antarkticheskoĭ poliarnoĭ frontal'noĭ zony (APFZ) so stepen'iu termoklinnosti frontal'nogo razdela i raspredeleniem khlorofilla "a"], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.53-57, In Russian. 8 refs.

DLC QH84.2.P45

The spatial distribution of the K criterion, typical of the fine thermohaline water structure of the Antarctic Convergence, allows determination of the northern and southern boundaries of the front and, through comparison of the vertical distribution of water temperature and fluorescence, shows increased values of chlorophyll-*a* in the frontal thermohaline structure areas.

J-53765

Emel'ianov, M.V., Shapiro, G.I., **Hydrophysical structure of the Second Frontal Zone in the Scotia Sea and its relation to the distribution of chemical matter and biological objects** [Gidrofizicheskaia struktura Vtorichnoĭ frontal'noĭ zony moria Skota i ee sviaz' s raspredeleniem khimicheskikh veshchestv i biologicheskikh ob"ektov], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.57-62, In Russian. 10 refs.

DLC QH84.2.P45

Results are discussed, and presented in graphs, of studies carried out in Dec. 1985 on board the *Akademik Kurchatov* in the Second Frontal Zone of the Scotia Sea. The spatial distribution of physical, chemical and biological water characteristics, and how they relate to each other, is analyzed.

J-53766

Lanin, V.I., **Oceanographic bases of the formation, functioning and interannual ecosystem variability in antarctic seas** [Okeanograficheskie osnovy formirovaniia, funktsionirovaniia i mezhgodovoĭ izmenchivosti sostoianiia ekosistem antarkticheskikh moreĭ], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.63-80, In Russian. 17 refs.

DLC QH84.2.P45

Studies on the central sector of the Indian Ocean show a link between higher water temperatures, a significant thickening of the warm deep-water masses and a decrease of thickness of the surface layers, and the southerly deflection of the Antarctic Circumpolar Current (ACC) over the Kerguelen Plateau. Results of investigations of ecosystems in Commonwealth Sea show plankton concentrations to be related to the general interannual variability of the ACC.

J-53767

Shurunov, N.A., **Hydrometeorological factors and water bioproductivity of the Ross Sea** [Gidrometeorologicheskie faktory, opredeliaiushchie bioproduktivnost'vod moria Rossa], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.80, In Russian.

DLC QH84.2.P45

Increased bioproductivity levels in the Ross Sea are linked to the positive values of water temperature anomalies during spring and summer.

J-53768

Zhigalov, I.A., Darnitskiĭ, V.B., Matveev, V.P., **Interannual variability and periodicities of physico-chemical characteristics in the Pacific and Indian Oceans and their ecosystem dynamics** [Mezhgodovaia i raznoperiodnaia izmenchivost' fiziko-khimicheskikh kharakteristik v tikhookenskom i indookeanskom sektorakh IUzhnogo okeana kak element dinamiki ego ekosistem], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.81-82, In Russian.

DLC QH84.2.P45

Data obtained from over 1200 hydrological stations in the 120-163E and 55-67S sectors in the Eltanin Fracture Zone area in 1973-1988 are analyzed for variations of water temperature and nutrient content. Results show the occurrence of 2- and 4-year periodicities over the last 10-15 years.

J-53769

Briantsev, V.A., Bibik, V.A., **Role of water dynamics in antarctic krill swarm formation and movement** [Rol' dinamiki vod v obrazovanii skopleniĭ i peremeshcheniĭ antarkticheskogo krilia], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.82, In Russian. 3 refs.

DLC QH84.2.P45

Graphic comparison of thermohaline characteristics and krill distribution in the Commonwealth Sea in Dec. 1983-Mar. 1984 shows that krill concentrations coincide with zones having characteristics of mesoscale (tens of km) anticyclonic eddies observed in the upper 50-100 m water layer. The maximum and minimum average speeds of krill swarm movement are estimated at 11 and 2 miles/day, respectively.

J-53771

Lanin, V.I., Pelevin, A.S., **Environmental conditions and formation of icefish concentrations in the Cosmonaut Sea** [Usloviia obitaniia i obrazovaniia skopleniĭ ledianoĭ ryby Vil'sona v more Kosmonavtov], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.83-90, In Russian. 5 refs.

DLC QH84.2.P45

Data on water dynamics and structure over the shelf, slope and deep-water part of the Cosmonaut Sea are considered in an attempt to explain the absence of icefish *(Chaenodraco wilsoni)* concentrations on Ledyanaya Bank in Jan. and their appearance there in Mar. 1985, as well as the mechanism of "hydrodynamic trap" formation over the shelf banks. It is concluded that the pattern of icefish distribution in the shelf zone in different years is likely to be associated with arrival of transformed deep water to the shelf zone and temperature inversion in the near-bottom layer, which creates conditions favorable for the formation over the shelf banks of "hydrodynamic traps" capable of accumulating krill in the upper layer and enabling their downward movement to the near-bottom layer where they are fed on by the icefish.

J-53772

Lanin, V.I., **Oceanographic preconditions for fish productivity formation and ichthyocene composition on islands and seamounts** [Okeanograficheskie predposylki formirovaniia ryboproduktivnosti i sostava ikhtiotsena v raĭonakh ostrovov i podvodnykh gor IUzhnogo okeana], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.90-96, In Russian. 9 refs.

DLC QH84.2.P45

It is believed that predominance of bottom fishes in the ichthyofauna of antarctic waters and adaptation of these species to feeding on pelagic macroplankton (mainly euphausiids) are associated with a permanently acting complex of abiotic and biotic factors underlying the mechanism of fish productivity formation. Long-term investigations in the Indian sector of the southern ocean suggest that practically the same hydrodynamic and hydrophysical processes occur over the Ob and Lena banks, in the shelf and slope areas of Kerguelen and Heard islands and over the antarctic continental slope and shelf banks. These processes lead to the concentration of pelagic macroplankton over bottom elevations and its subsequent sinking to near-bottom layers inhabited by fishes (Notothenidae, Channichthyidae). The combined effect of bottom topography and transformation of antarctic water structure is considered in detail.

J-53773

Darnitskiĭ, V.B., Boldyrev, V.Z., **Reasons for local ecosystem instabilities in the Eltanin Fracture Zone** [O prichinakh lokal'noĭ neustoĭchivosti ekosistem podvodnykh gor zony razlomov Eltanin], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.97, In Russian.

DLC QH84.2.P45

Hydrodynamic processes studied in the southern sector of the Eltanin Fracture Zone in the Antarctic Convergence during July 1989 are described. Results indicate that these processes have a significant influence on the structure and variability of biological communities in the thalassobathyal, averaging 71.4 mg/cu m of mesoplankton biomass in the 100-0 m water layer.

J-53774

Gorshkov, A.N., Gudoshnikov, IU.P., Smagin, V.M., **Spatial distribution of hydrochemical indices in the southern ocean** [Osnovnye cherty prostranstvennogo raspredeleniia gidrokhimicheskikh pokazateleĭ IUzhnom okeane], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.99-107, In Russian. 6 refs.

DLC QH84.2.P45

Data obtained at approximately 5000 hydrological stations in the southern ocean south of 40°S, between 1920 and 1982, are analyzed. The distribution of major hydrochemical parameters such as dissolved oxygen, dissolved phosphates, pH levels and total alkalinity, are discussed and shown on maps.

J-53775

Arzhanova, N.V., Zubarevich, V.L., Naletova, I.A., **Organic and inorganic nitrogen in the Scotia Sea** [Azot mineral'nykh i organichekikh soedineniĭ v vodakh moria Skotiia], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.108-109, In Russian.

DLC QH84.2.P45

Data obtained during the 1985 summer cruise of the *Akademik Knipovich* in the Scotia Sea and adjacent waters on the contents of mineral and organic nitrogen show that the surface to 1000 m layer contains ammonium, nitrites, nitrates and organic nitrogen, as well as urea- and amino acid- nitrogen.

J-53778

Dafner, E.V., Mordasova, N.V., **Phytoplankton development at the southern boundary of the Polar Frontal Zone in the Atlantic sector of the Antarctic** [Usloviia razvitiia fitoplanktona u iuzhnoĭ granitsy Poliarnoĭ frontal'noĭ zony atlanticheskogo sektora Antarktiki], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.125-126, In Russian.

DLC QH84.2.P45

Sep.-Dec. 1993 surveys of the area 26-40°W, 48'52°S made it possible to observe the process of nutrients uptake by phytoplankton during the vegetation period. Particular attention was paid to the southern boundary of the Polar Frontal Zone (PFZ), where the PFZ waters come into contact with the Weddell Sea water of the high-latitude modification. Data on the contents of phosphates, nitrates, Si and oxygen saturation are analyzed in relation to phytoplankton development. Based on changes of Si content in the photic layer (50 m) over the period Oct. 12 to Dec. 2, the daily production of phytoplankton is estimated at 0.8 gC/m^2, which is comparable to that in highly productive regions of the World Ocean.

J-53780

Aktsipetrov, O.A., Baulin, E.V., Mikhaĭlova, IU.V., Chekaliuk, A.M., **Remote laser sensing of phytoplankton fluorescence fields in the South Atlantic Ocean** [Distantsionnye lazernye issledovaniia fluorescentnykh poleĭ fitoplanktona v Antarktike], Pelagicheskie ekosistemy IUzhnogo okeana: sbornik nauchnykh trudov (Pelagic ecosystems of the southern ocean: collected scientific papers). Edited by N.M. Voronina, Moscow, Nauka, 1993, p.134-140, In Russian. 4 refs.

DLC QH84.2.P45

The potentialities of laser phytoplankton fluorescence diagnostics are discussed, and a shipborne lidar used during the 43rd cruise of the R/V *Dmitriĭ Mendeleev* in Jan.-May 1989 is briefly described. The lidar was used to study horizontal variation in the fluorescence fields of surface phytoplankton, to measure vertical distribution profiles of phytoplankton fluorescence intensity and temporal variations of different scales (days, weeks, months). Continuous en route (3500 km) monitoring of horizontal phytoplankton fluorescence distribution provides support for the hypothesis that an active role in the formation of macroscale distributions in the surface layer is played by wind mixing. For the first time data were obtained on not only local (1 km) and mesoscale (10 km) but also macroscale (100 km) variations of phytoplankton fluorescence fields in the Atlantic sector of the Antarctic.

J-53812

Silva S., N., Helbling, E.W., Villafañe, V.E., Amos, A.F., Holm-Hansen, O., **Variability in nutrient concentrations around Elephant Island, Antarctica, during 1991-1993,** *Polar research,* June 1995, 14(1), p.69-82, 54 refs.

The nutrient status of the various water mass structures within a large sampling grid around Elephant I. are reported and the nutrient concentrations relative to data from the physical and biological components of the Antarctic Marine Living Resources Programme are discussed. Samples were taken from eleven depths at 17 stations in 1991, at four depths at 144 stations in 1992 and 182 stations in 1993. There was considerable variability in the concentrations of all three nutrients within the study area, but silicic acid showed the greatest variance among the water masses present in the sampling grid. The ratios of the nutrient deficits (difference in winter and summer values) in the upper 100 m differed considerably in Drake Passage waters as compared to Bransfield Strait waters, with both nitrate and silicic acid showing the greatest variance. Nutrient deficits did not increase from Jan. to Feb., indicating that rates of replenishment of nutrients to the euphotic zone by physical processes and/or biological regeneration were approximately equal to the rate of uptake and assimilation by phytoplankton during that time period. (Auth. mod.)

J-53823

DiTullio, G.R., Smith, W.O., Jr., **Relationship between dimethylsulfide and phytoplankton pigment concentrations in the Ross Sea, Antarctica,** *Deep-sea research, Part I,* June 1995, 42(6), p.873-892, 58 refs.

Although relatively low chl *a* levels were encountered in Ross Sea measurements, the DMS inventory in the photic zone ranged from 81 to 3484 μmol/m^2. In comparison, the DMSO$_p$ standing stock was very low and accounted for only 11% of the average integrated DMS concentration. DMS:chl *a* ratios were significantly higher in waters dominated by *Phaeocystis antarctica* compared to diatom-dominated waters. A strong DMS gradient was observed from south to north with the highest DMS concentrations measured in the southern Ross Sea and the lowest observed in the northern Ross Sea. Areas with high fucoxanthin:chl *a* ratios were associated with relatively low DMS concentrations as compared to areas with high HEX:chl *a* ratios. There was no significant linear relationship, however, observed between DMS and HEX, chl *a*, or primary productivity in waters where *P. antarctica* dominated. In contrast, a significant correlation was observed between DMS and chl *a* in the northern Ross Sea where diatoms dominated and where the DMSP$_p$:DMS ratio was the highest. (Auth. mod.)

J-53824

Orsi, A.H., Whitworth, T., III, Nowlin, W.D., Jr., **On the meridional extent and fronts of the Antarctic Circumpolar Current,** *Deep-sea research, Part I,* May 1995, 42(5), p.641-673, 74 refs.

The geopotential anomaly of the sea surface relative to 1000 db reveals the highly-sheared eastward flow of the ACC and the strong steering of the current by the ridge system around Antarctica. The near-surface property distributions differentiate the ACC waters from the warmer and saltier waters of the subtropical regimes. The subtropical Front (STF) marks the northernmost extent of subantarctic waters. Distributions of properties on isopycnal surfaces show an abrupt end to the characteristic signal of the Upper Circumpolar Deep Water (UCDW), as this water mass shoals southward and is entrained into the surface mixed layer. This sharp water mass boundary nearly coincides with the southernmost circumpolar streamline passing through Drake Passage. To its south are the weakly-sheared circulations of the subpolar regime. The poleward edge of the UCDW signal is a reasonable definition of the southern boundary of the ACC. At Drake Passage, three deep-reaching fronts account for most of the ACC transport. Well-established indicators of the Subantarctic Front and Polar Front are traced unbroken around Antarctica. The third deep-reaching front observed to the south of the Polar Front at Drake Passage also continues with similar characteristics as a circumpolar feature. (Auth. mod.)

J-53828

Antarctic oceanography, Regional oceanography: an introduction; by M. Tomczak and J.S. Godfrey, Oxford, UK, Elsevier, Ltd., 1994, p.67-87, Refs. p.397-409.

DLC GC11.2.T66 1994

Southern ocean is used as a convenient term to describe the sea water south of the variable Subtropical Front. This body of water encompasses 77 million sq km of surface area, about 22% of the surface of the World Ocean. At various depths it has direct access to all other oceanic regions except the Arctic. Other terms are used to denote other aspects of the southern ocean, such as the Antarctic and Subantarctic Fronts, the Antarctic Convergence and Divergence; in reality, these regions are quite variable and complex both within themselves and in relation to each other: they move with the tides and currents. Other topics bearing on the southern ocean include precipitation and ice, hydrology and water masses, zonal and meridional flow of currents and movements of water masses. The combined effect of consistently high wind speeds, little variation in wind direction, and no land barriers to impede the build-up of a fully developed sea, makes the southern ocean the global region having the highest average wave height. All of these features of the southern ocean tend to highlight the complex nature of the waters surrounding the antarctic continent.

J-53840

Turner, D.R., Owens, N.J.P., **Biogeochemical study in the Bellingshausen Sea: overview of the STERNA 1992 expedition,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.907-932, Refs. p.930-932.

A general overview and background of a two-ship study to examine biogeochemical fluxes in the marginal ice-zone of the Bellingshausen Sea, SE Pacific sector of the southern ocean is presented. The major feature studied was an intense band of chlorophyll that was found geographically close to a receding ice-edge. However, the bloom appeared not to be a result of a shallow mixed layer caused by ice-melt stabilization, but rather associated with an oceanic front that coincided with the ice-edge. Details of the hydrographic conditions existing along the 85°W meridian from the ice-edge to open water to the north, and detailed surveys of surface hydrographic conditions, are presented. (Auth.)

J-53841

Read, J.F., Pollard, R.T., Morrison, A.I., Symon, C.J., **On the southerly extent of the Antarctic Circumpolar Current in the southeast Pacific,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.933-954, Refs. p.953-954.

A front at 67°S in the Bellingshausen Sea at 85°W is shown to be part of the Antarctic Circumpolar Current (ACC) and the southernmost zone of concentrated eastward transport at that longitude. The front lies 6° south of the Polar Front at 88°W and 3° north of the Continental Water Boundary. The front is continuous to the east through Drake Passage where it forms a southern branch of the Polar Front, for which reason the authors have named it the Southern Polar Front. Data from a towed profiling CTD were able to distinguish the Polar Front from the Southern Polar Front, even though they were only 0.5° apart. Thus the width of the ACC south of the Polar Front varies considerably. About a third of the transport of the ACC also lay south of the Polar Front, with 15 Sv carried by the Southern Polar Front alone at 85°W. Distinguishing features of the Southern Polar Front were a water mass boundary associated with a zone of concentrated baroclinic flow and a surface salinity minimum. These features also have been found at the Greenwich Meridian at 53°S, so the Southern Polar Front can be traced round at least a quarter of the globe. (Auth. mod.)

J-53842

Pollard, R.T., Read, J.F., Allen, J.T., Griffiths, G., Morrison, A.I., **On the physical structure of a front in the Bellingshausen Sea,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.955-982, Refs. p.980-982.

The structure of a front observed at 67°S in austral spring in the Bellingshausen Sea is described. A seasonal halocline was present throughout the survey area on both sides of the front, at the base of a mixed layer 50-70 m deep. The signature of the previous winter's mixed layer depth could be seen in the weak stratification between 70 and 150 m. The subsurface temperature minimum within the winter mixed layer was significantly colder south of the front (-1.7°C) than north of it (-1.1°C). The front, defined by eastward velocities greater than 10 cm/s, was 70-80 km wide with flow at speeds of up to 50 cm/s in the surface layer. The zone within which water mass changes occurred was narrower, about 40 km, contained within the zone of eastward flow and extending down to 1000 m. The strong velocities in the frontal jet caused differential advection of surface properties from upstream (west) of the survey area, resulting in sharp cross-frontal gradients of salinity and chlorophyll *a*. Chlorophyll was largest (over 5 mg/m^3) in a band barely 10 km wide that extended along-front for well over 100 km and was tightly constrained along the southern flank of the front where isopycnals outcropped from the winter mixed layer into the surface layer across the seasonal halocline. (Auth. mod.)

J-53843

Sagan, S., Weeks, A.R., Robinson, I.S., Moore, G.F., Aiken, J., **Relationship between beam attenuation and chlorophyll concentration and reflectance in antarctic waters,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.983-996, Refs. p.995-996.

Optical and biological data collected during the two-month R.R.S. *Discovery* expedition in antarctic waters in the austral spring were used to examine the relationships between *c* (660 nm), chlorophyll *a* and the reflectance ratios R(443)/R(550), R(490)/R(550) and R(443 nm). Values of (c-c_w) (660 nm) varied from 0.20 to 1.2/m, being generally positively correlated with the chlorophyll concentration. The computed values of the pigment specific beam attenuation coefficient c^* were greater than those typical in Case I waters, exceeding 0.9 m^2/mg, reducing the accuracy of the chlorophyll remote sensing algorithms designed for Case I waters. The covariance of phytoplankton and related pigments with beam attenuation was examined by the regression equation $c-c_w=A+B(\text{Chl } a+\text{phaeo})$, and the residuals were used to identify the non-chlorophyll dependent data in the region. When the non-chlorophyll dependent data were removed, the accuracy of the chlorophyll remote sensing model was significantly improved. (Auth.)

J-53844

Weeks, A.R., et al, **Distribution of acoustic backscatter from zooplankton compared with physical structure, phytoplankton and radiance during the spring bloom in the Bellingshausen Sea,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.997-1019, Refs. p.1017-1019.

The distribution of zooplankton as indicated by acoustic backscatter was compared with that of the phytoplankton biomass, with the degree of the shading caused by the presence of the bloom, with the density structure of the top 250 m of the water column and the current flow in the Bellingshausen Sea in the austral spring, 1992. High concentrations of phytoplankton were observed in an area between 67-68.5°S and 84-88°W. The relative importance of these parameters to the distribution of the zooplankton was observed to vary at different depths between 0 and 300 m. Near the surface and below the pycnocline the light field and the phytoplankton concentrations were more important, but in the intermediate region of the greatest vertical density differences $\sigma0$ was the most important parameter. The spatial spectra of the zooplankton abundance at different depths in the water column were compared. (Auth.)

J-53846

Whitehouse, M.J., Priddle, J., Woodward, E.M.S., **Spatial variability of inorganic nutrients in the marginal ice zone of the Bellingshausen Sea during the Austral spring,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1047-1058, Refs. p.1057-1058.

Data on nutrients (nitrate, nitrite, ammonium, phosphate, silicate), biogenic-silica and chlorophyll *a* concentrations were collected along a south-to-north transect through the marginal ice zone of the Bellingshausen Sea during the austral spring of 1992. There was a marked gradient in near surface (≤100 m) concentrations from the most southerly occupied station to the northernmost. Nitrate, phosphate and silicate concentrations decreased along the transect from 33 to 21, 2.2 to 1.2 and 76 to 35 mmol/m^3, respectively. Nitrite, ammonium and biogenic-silica levels increased from 0.04 to 0.16, 0.01 to 2.5 and 0.2 to 4 mmol/m^3, respectively from south to north. Chlorophyll *a* concentrations increased from 0.1 at the most southerly station to >4.0 mg/m^3 in the north. A simple ice-melt model suggests that only a portion of the previous winter's sea-ice had melted in the study area. The impact of this ice-melt on nutrient concentrations was trivial. Predicted time scales of nutrient removal by phytoplankton growth varied for the three nutrients. (Auth. mod.)

J-53847

Turner, S.M., Nightingale, P.D., Broadgate, W., Liss, P.S., **Distribution of dimethyl suphide and dimethylsulphoniopropionate in antarctic waters and sea ice,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1059-1080, Refs. p.1079-1080.

Dimethyl sulphide (DMS) and particulate and dissolved fractions of dimethylsulphoniopropionate (DMSPp and DMSPd) were measured on two simultaneous cruises through the Drake Passage to the Bellingshausen Sea during Oct. to Dec. 1992. Overall, average surface water concentrations for DMS and DMSPp were 2 nM (0.15-27 nM) and 25.6 nM (2-69 nM), respectively. Higher concentrations were observed in a phytoplankton bloom forming a band between 67.2° and 68.2°S, associated with the

Southern Polar Front. Concentrations of DMS + DMSP in ice were very high (up to 546 nM) but in the underlying water were 20 to 500 times lower. Comparison of sulphur data, pigments and phytoplankton species counts showed correlation of DMSPp with 19'-hexanoyloxyfucoxanthin (Hex) and *Phaeocystis* sp. A seasonal cycle for DMS in antarctic surface waters, based on all available literature data, is discussed in terms of the probable antarctic ocean contribution to the global ocean DMS flux. (Auth.)

J-53848

Robertson, J.E., Watson, A.J., **Summer-time sink for atmospheric carbon dioxide in the southern ocean between 88°W and 80°E,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1081-1091, 27 refs.

Measurements of surface water dissolved carbon dioxide are presented from two cruises in the southern ocean, from Bellingshausen Sea to Princess Elizabeth Trough, with a number of observations close to the ice edge. The data, collected from early to late austral summer 1992-93, indicate that the ocean in these regions was acting as a sink for atmospheric carbon dioxide at this time. No correlation between carbon dioxide levels and the standing stock of phytoplankton or sea-surface temperature was observed, except in isolated regions of high chlorophyll concentration and across small source regions associated with fronts, respectively. Assuming that the observations can be generalized to the region encircled by the cruise tracks, the authors calculate CO_2 uptake for this region during the four months that the cruises took place. The observation of a sink is consistent with the most recent estimates of the regional budgets derived from atmospheric isotope data. Most data sets from earlier years show the region as neutral with respect to atmospheric CO_2, so it appears possible that the widespread sink observed, at the very least between 88°W and 80°E, is a recent phenomenon not present in some previous surveys. (Auth. mod.)

J-53849

Bellerby, R.G.J., Turner, D.R., Robertson, J.E., **Surface pH and $p\mathrm{CO}_2$ distributions in the Bellingshausen Sea, southern ocean, during the early Austral summer,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1093-1107, Refs. p.1105-1107.

Measurements of the carbon dioxide system (pH, $p\mathrm{CO}_2$) from the Bellingshausen Sea are discussed in relation to varying biological activity and hydrography. The pH was determined using on-line indicator spectrophotometry and varied between 7.65 and 7.85 (at 25°C) and between 8.04 and 8.25 at *in situ* temperatures. Except for the Bransfield Strait, $p\mathrm{CO}_2$ was below atmospheric $p\mathrm{CO}_2$ for the duration of the cruise, with the average level being 295±32 µatm (1 SE). Large mesoscale variability with no single control on the surface seawater carbon dioxide system was observed, although the majority of the study area was predominantly influenced by the hydrography of the circumpolar waters. The most significant exception was a region with high chlorophyll concentration south of the Southern Polar Front. (Auth.)

J-53850

Kennedy, H., Robertson, J.E., **Variations in the isotopic composition of particulate organic carbon in surface waters along an 88°W transect from 67°S to 54°S,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1109-1122, Refs. p.1121-1122.

The concentration and isotopic composition of carbon were measured in suspended particulate organic matter in surface waters of the South Pacific Ocean during the austral summer. Concurrent measurements of total dissolved inorganic carbon (ΣCO_2), pCO_2, particulate organic carbon (POC), salinity, chlorophyll and temperature provide an opportunity to study the covariance of these parameters with changes in the isotopic composition of particulate organic carbon (δ^{13}C-POC). The south-north transect did not show any significant changes in POC (10-19 mmol/m^3) or chlorophyll (0.5-1 mg/m^3), while δ^{13}C-POC variations of approximately 4 per mill were recorded. Although surface water CO_2(aq) is substantially out of equilibrium with the local atmosphere, the isotopic changes are negatively correlated with the concentration of dissolved carbon dioxide along the transect, and follow the general trends predicted from previously determined relationships. (Auth. mod.)

J-53851

Cripps, G.C., **Biogenic hydrocarbons in the particulate material of the water column of the Bellingshausen Sea, Antarctica, in the region of the marginal ice zone,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1123-1135, 16 refs.

The biogenic hydrocarbon content of particulate matter of the Bellingshausen Sea in the region of the marginal ice zone (MIZ) has been investigated. Particulates were sampled from four depths to 200 m in pack ice and at the ice edge, and from seven depths to 3000 m in open ocean. Total *n*-alkane concentrations associated with particulates increased from 200 ng/l under the pack ice to 1000 ng/l in the open ocean, and decreased with depth in open water to 15 ng/l at 3000 m. The influence of phytoplankton on particulate material was shown to be negligible under the ice but extended horizontally and vertically as the ice edge retreated. Sea-ice algae did not appear to seed the phytoplankton growth under the ice or the subsequent "bloom" at the MIZ. The alkane signature of phytoplankton from the MIZ bloom was detected at a depth of 200 m near the ice edge, at 500 m in open sea, and in surface sediments (4100 m). It was concluded that the majority of particulate material in the water column was algal in origin. (Auth. mod.)

J-53852

Robins, D.B., et al, **Relationship between suspended particulate material, phytoplankton and zooplankton during the retreat of the marginal ice zone in the Bellingshausen Sea,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1137-1158, Refs. p.1156-1158.

The distribution, abundance and composition of suspended particulates, phytoplankton and zooplankton biomass were investigated for the marginal ice zone in the Bellingshausen Sea during the austral spring of 1992. Marked changes were observed between the amount and composition of particulates under the sea-ice and those in open waters. Measures of phytoplankton abundance (chlorophyll) ranged from ca. 0.05 µg/l under the ice to 3 µg/l in the open waters to the north. The high nutrient concentrations and low level of phytoplankton under the ice suggest that this region is typical of over-wintering conditions and provides a suitable background comparison to the development of more productive, recently ice-free waters, further north. The biochemistry of particulates (lipid in particular), a more sensitive measure of environmental growth conditions, showed the area as a whole to be broadly split into two: under ice (light limited) and open water (no light limitation). Total particulate carbon was almost entirely composed of inorganic carbon under the ice; waters away from the ice edge also contained significant levels of inorganic carbon. (Auth. mod.)

J-53856

Bury, S.J., Owens, N.J.P., Preston, T., **^{13}C and ^{15}N uptake by phytoplankton in the marginal ice zone of the Bellingshausen Sea,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1225-1252, Refs. p.1248-1252.

A two-ship cruise to the Bellingshausen Sea marginal ice zone (MIZ) in the austral spring-summer 1992 enabled a detailed study of the phytoplankton dynamics during the retreat of the ice sheet. Stations were set up along a transect from within the ice sheet at 70°S, 85°W to the open ocean 67°S, 85°W, and the rates of primary production and nitrogen uptake were determined in the ice and water column using *in situ* ^{13}C and ^{15}N incubation techniques. Nitrogen uptake was subdivided into components of nitrate, ammonium and urea uptake, and fractionated into <20 µm and >20 µm size classes. The ice station water column had a very low biomass, with values integrated to 30 m of 3 mg chl/m^2 and 25 mmol PON/m^2, high nutrient concentrations, and integrated carbon and nitrogen uptake values of 24 mg C/m^2/day and 12 mg N/m^2/day. Nutrient concentrations decreased and biomass and productivity in the water column increased towards the northernmost open water station. (Auth. mod.)

J-53857

Waldron, H.N., Attwood, C.G., Probyn, T.A., Lucas, M.I., **Nitrogen dynamics in the Bellingshausen Sea during the Austral spring of 1992,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1253-1276, Refs. p.1274-1276.

A series of ^{15}N experiments were conducted in the early summer of 1992 during the course of cruise 198 of R.R.S. *Discovery,* with a focus on the seasonal ice zone (SIZ) of the Bellingshausen Sea. Nitrogen (NO_3, NH_4 and urea) uptake was measured over the nominal euphotic zone, and size fractionation experiments of a similar nature were conducted on surface waters. The most productive zone during this study was not associated with stable ice-melt water but with a west-east oriented, haline dominated density front centered around 67.3°S. The pelagic bloom coincident with the area south of the front had a banded structure with chlorophyll *a* concentrations up to 5 mg/m^3. Integrated N uptake rates within the bloom varied between 56 and 34 mmol N/m^2/day, with a decreasing trend from north to south. A similar trend was evident in the *f*-ratios, where values decreased from 0.6 to 0.3. From size fractionated experiments in the bloom it was found that 82-87% of the chlorophyll *a* was in the netplankton fraction, which also accounted for 28 to 95% of the N uptake. The bloom was dominated by *Porosira glacialis, Coscinodiscus bouvet, Thallassiosira antarctica* and *Phaeocystis* spp. (Auth. mod.)

J-53860

Shimmield, G.B., Ritchie, G.D., Fileman, T.W., **Impact of marginal ice zone processes on the distribution of ^{210}Pb, ^{210}Po and ^{234}Th and implications for new production in the Bellingshausen Sea, Antarctica,** *Deep-sea research. Part II,* July-Sep. 1995, 42(4-5), Topical studies in oceanography. Southern ocean JGOFS: the U.K. "STERNA" study in the Bellingshausen Sea, edited by D.R. Turner, N.J.P. Owens and J. Priddle, p.1313-1335, Refs. p.1334-1335.

The vertical distributions of ^{210}Pb, ^{210}Po and ^{234}Th in both dissolved and particulate phases of seawater were measured at five stations along the 85°W meridian in the Bellingshausen Sea. Sea-ice conditions during the expedition ranged from fully ice-covered (fast ice) to open water away from the marginal ice zone. Concurrent primary productivity and algal chlorophyll measurements revealed a band of high productivity at approximately 67°30'S, which remained in a rather static location during ice meltback. Along the transect a progressive increase in removal ("scavenging") and sinking of ^{210}Pb, ^{210}Po and ^{234}Th occurred towards the north (open water conditions). Application of a simple, irreversible scavenging model, and particulate organic carbon and organic nitrogen to radionuclide ratios measured on suspended particulate matter, allows the calculation of export production for this region. (Auth. mod.)

J-53866

Gleitz, M., Van der Loeff, M.M.R., Thomas, D.N., Dieckmann, G.S., Millero, F.J., **Comparison of summer and winter inorganic carbon, oxygen and nutrient concentrations in antarctic sea ice brine,** *Marine chemistry,* Oct. 1995, 51(2), p.81-91, 49 refs.

During summer (Jan. 1991) and winter (Apr. 1992) cruises to the southern Weddell Sea, brine samples were collected from first year sea ice and analyzed for salinity, temperature, dissolved oxygen and major nutrient concentrations. Additionally, the carbonate system was determined from measurements of pH and total alkalinity. During winter, brine chemical composition was largely determined by seawater concentration in the course of freezing. Brine temperatures ranged from -1.9 to -6.7°C. Removal of carbon from the total inorganic carbon pool was related to reduced nutrient concentrations, indicating the presence of photosynthetically active ice algal assemblages in the winter sea ice. However, nutrient and inorganic carbon concentrations did not generally reach growth limiting levels for phytoplankton. The concurrent depletion of major nutrients generally corresponded to uptake ratios predicted from phytoplankton biochemical composition. Primary productivity in summer sea ice is apparently sustained until inorganic resources are fully exhausted, resulting in brine chemical compositions that differ profoundly from those of surface waters. This may have important implications for pathways of ice algal carbon acquisition, carbon isotope fractionation, and for species distribution in the open water phytoplankton. (Auth. mod.)

J-53869

Italy, National Scientific Commission for Antarctica, **Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography,** Genoa, 1991, 409p., Refs. passim. For individual papers see B-53875 through B-53883 and J-53870 through J-53874.

This volume contains a collection of 14 reports based on physical, chemical and biological studies carried out during the 2nd Italian oceanographic expedition (1989-1990) in the pelagic South Pacific Ocean and in the neritic area of Terra Nova Bay. The data are presented in numerous tables and graphs.

J-53870

Catalano, G., Benedetti, F., Goffart, A., Iorio, M., **Distribution of dissolved oxygen, pH, total alkalinity and nutrients in the Southern Ocean and the Ross Sea (R/V "Cariboo" 1989-90 cruise),** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.11-23, 5 refs.

The bulk of this report consists of tables of data collected at 25 stations, located in the South Pacific Ocean and the Ross Sea, between Nov. 25, 1989 and Jan. 7, 1990. The tables show the number of the station, its coordinates, depth at which the water samples were collected, and the chemical profiles of the samples.

J-53871

Catalano, G., Benedetti, F., Iorio, M., **Coastal oceanography from Cape Russel to Campbell Ice Tongue (Terra Nova Bay). Dissolved oxygen, nutrients, pH, total alkalinity and total inorganic carbon distribution,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.25-32, 7 refs.

Sea water samples were collected at 17 coastal stations and analyzed in the laboratory of Terra Nova Bay Station to determine concentrations of dissolved oxygen, nutrients, pH, total alkalinity, total inorganic carbon and salinity. The operation zone is shown in a figure; the coastal line stretches for about 30 n. miles, with a topography including continental ice (Evans Cove), a penguin rookery (Adélie Cove) and several inlets (Evans Cove, Adélie Cove, Tethys Bay and Gerlache Inlet).

J-53872

Fabiano, M., Povero, P., Catalano, G., Benedetti, F., **Hydrological data collected during the biological, chemical and geological sampling in Terra Nova Bay,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.35-71, 5 refs.

The investigated area in Terra Nova Bay, from Jan. 11 to Feb. 4, 1990, stretched between Campbell Glacier and Evans Cove; the location of the hydrological stations are shown in a figure and the data, including meteorological conditions and hydrological profiles, are presented in tables and charts.

J-53873

Fabiano, M., Povero, P., Danovaro, R., Medica, D., Bruzzone, R.,

Particulate organic matter in Terra Nova Bay, Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.73-112, 13 refs.

Samples collected in Terra Nova Bay between Campbell Glacier and Evans Cove Jan. 11 to Feb. 4, 1990 were analyzed for total suspended matter, particulate carbohydrates, proteins, lipids, organic matter and adenosine triphosphate. Results are presented in tables and charts.

J-53874

Fabiano, M., Povero, P., Medica, D., Bruzzone, R., **Distribution of particulate organic matter in antarctic water (Ross Sea),** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1989-90: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1991, p.113-137, 10 refs.

Samples collected in Terra Nova Bay and the Antarctic Convergence on board the research vessel *Cariboo* between Nov. 23, 1989 and Jan. 7, 1990 were analyzed for total suspended matter, particulate carbohydrates, proteins, lipids and organic matter. Results from each station are presented in tables and charts.

J-53884

Italy, National Scientific Commission for Antarctica, **Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography,** Genoa, 1990, 503p., Refs. passim. For individual papers see A-53899, B-53887 through B-53898, J-53885 and J-53886.

This volume contains a collection of 15 reports based on the oceanographic research carried out by the 1st Italian expedition to the Ross Sea, from Dec. 20, 1987 to Feb. 29, 1988. The studies covered hydrological, microbiological and chemical aspects as well as primary productivity, plankton, benthos, nekton and other ichthyological resources. The data are presented in numerous tables and graphs.

J-53885

Boldrin, A., Stocchino, C., **On the hydrological characteristics of Terra Nova Bay (Ross Sea - Antarctica),** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.11-57, 9 refs.

A hydrological survey carried out in Terra Nova Bay in Jan. and Feb. 1988 is discussed. Tabulated data and figures show the following: general data relating to all the hydrological stations (designated number, date and local time of measurement, depth and geographic co-ordinates); marine meteorological data and the values of temperature, salinity, density, potential temperature at 0 dBar; isolines in the form of potential temperature, salinity and density at 0.5, 30 and 100 m depths for the coastal area; the distribution of the same parameters along the East-West transect; and the vertical profile of potential temperature and salinity at all the stations.

J-53886

Catalano, G., Benedetti, F., **Distribution of nutrients in the Terra Nova Bay and in the Ross Sea,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part I, physical, chemical and biological oceanography, Genoa, 1990, p.61-83, 11 refs.

The main objective of the expedition of 1987-88 was to characterize chemically, through the analysis of several parameters, the basin of Terra Nova Bay and to study the spatio-temporal variations of these parameters. The parameters chosen as main targets were: dissolved oxygen (O_2) and nutrients (NO_3, NO_2, NH_3, PO_4, SiO_4). A preliminary analysis of some major constituents was also carried out: fluorides (F), sulphates (SO_4), calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), lithium (Li) and strontium (Sr). The zone of operation corresponded to a grid of 40 stations, covering the whole of Terra Nova Bay and a small part of the Ross Sea. Tabulated results are presented.

J-53901

Innamorati, M., et al, **Phytoplankton ecology in the Ross Sea,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part II, physical, chemical and biological oceanography, Genoa, 1990, p.9-63, 12 refs.

Investigations carried out in Terra Nova Bay on phytoplankton biomass, spatial distribution, species composition and environmental factors, including characteristics of the water masses, are reported. Results are presented in tables and graphs.

J-53909

Amato, E., Relini, G., Tursi, A., **National research programme in the Antarctic: environmental impact assessment at sea: fouling experiment - first note,** Italy, National Scientific Commission for Antarctica. Oceanographic Campaign 1987-88: Data report, Part II, physical, chemical and biological oceanography, Genoa, 1990, p.263-277, 10 refs.

A preliminary report is presented on investigations carried out in 1988-1989 in Terra Nova Bay to assess the possible environmental impact from the Terra Nova Bay Station activities. Methods and equipment used are described; results are presented in tables.

J-53936

Massé, L., Faugères, J.C., Bernat, M., Pujos, A., Mézerais, M.L., **600,000-year record of Antarctic Bottom Water activity inferred from sediment textures and structures in a sediment core from the Southern Brazil Basin,** *Paleoceanography,* Dec. 1994, 9(6), p.1017-1026, 53 refs.

At the northern exit of the Vema Channel in the Southern Brazil Basin, deep currents linked with Antarctic Bottom Water flow (AABW, below 4200 m) have formed contouritic accumulations along the continental rise. Lithologic and textural investigations were carried out on a Kullenberg core in order to establish a chronology of late Pleistocene-Holocene fluctuations in AABW flow. The core, spanning the last 600,000 years, was recovered from a field of sediment waves. The deposits consist of fine grained muds. Two main types of facies can be identified: (1) yellowish brown muds, with frequent manganese enrichments forming dark laminae, and (2) homogeneous gray-green muds. Two indicators of paleocurrent activity have been considered: (1) erosional sediment features that give evidence for high amplitude and short-term current events, and (2) grain-size fluctuations (percentage of particles greater than 10 μm), indicating low amplitude and long-term variations. Two periods can be defined. The first one (ca. 600 to ca. 350 kyr B.P.) is characterized by an instability in current activity, with strong flow events recorded as erosional surfaces. The second period (350 kyr B.P. to present) is marked by globally weaker current activity and long-term fluctuations of lower amplitude and longer duration. (Auth. mod.)

J-53962

Roese, M., Speroni, J., **Dynamics of Bahía Paraíso waters and its link with Gerlache Strait** [Dinámica de las aguas en bahía Paraíso y su vinculación con el estrecho de Gerlache, Antártida], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1995, No.416, p.1-29, In Spanish with English summary. 27 refs.

During the summer of 1990-91, the authors studied the circulation in Paraíso Bay and Gerlache Strait using observations of iceberg drift, temperature, current and tidal measurements. Paraíso Bay has a peculiar climatology, where 66.6% of the time winds are calm, and have a mean duration of 17.5 hours. Coastal and bottom topography irregularities strongly condition the tidal currents, producing important countercurrents. The Eulerian and Lagrangian information collected for the flood tide depicts a counterclockwise circulation around Bryde I., while for the ebb tide the accumulated waters in Paraíso Bay drain through all of its entrances. The authors conclude that there is a current to the SE in the Bismarck Strait, originating in the Bellingshausen Sea. From the vertical temperature distribution in Gerlache Strait, they infer the existence of two mean subsurface currents which converge at Paraíso Bay: one in a NE direction, the other, with denser water, flows SW in the intermediate and deep layers of the Gerlache Strait. (Auth. mod.)

J-53989

Arístegui, J., Montero, M.F., **Plankton community respiration in Bransfield Strait (antarctic ocean) during austral spring,** *Journal of plankton research,* Aug. 1995, 17(8), p.1647-1659, Refs. p.1658-1659.

Community respiration (R) was determined in Bransfield Strait from oxygen changes in water samples incubated in borosilicate bottles maintained at *in situ* temperature. The respiratory electron transport system (ETS) activity of seawater communities was also measured from the same samples. The results do not differ significantly from other published results for the arctic and antarctic oceans. Assuming a respiratory quotient of unity, the areal respiration ranges between 0.45 and 1.69 g C/m^2/day (mean=0.8) would represent an important sink for the primary production reported for Bransfield Strait. The spatial distribution of community respiration showed higher values associated with the warmer and phytoplankton-rich waters outflowing from Gerlache Strait into Bransfield Strait, and with the front that separates Bellingshausen Sea waters from Weddell Sea waters. It is suggested that this pattern of distribution may be related to the transport of organic matter by the Bransfield Current along the front. (Auth. mod.)

J-54010

Zatsepin, A.G., Emel'ianov, M.V., **Regularities of intrusion water stratification in the south polar frontal zone of the Atlantic Ocean,** *Russian meteorology and hydrology,* 1995, No.1, p.25-30, Translated from Meteorologiia i gidrologiia. 9 refs.

Characteristic depths of ocean current intrusions and related temperature anomalies are determined from analysis of fine-structured heterogeneities of intrusion origin in vertical profiles of temperature in the south polar frontal zone. For each of the identified intrusions a transfrontal adiabatic scale considered as a horizontal intrusion scale is estimated. Correlation is obtained between this scale and a local baroclinic radius of intrusion. According to Woods' conception (1974) and Kuzmina and Rodionov's mathematical model (1992), this correlation is evidence of eddy dynamics of intrusions. Based on the interaction between eddies and intrusions, the coefficient of transfrontal exchange of heat and passive tracer is parameterized and evaluated. (Auth. mod.)

J-54021

Snaith, H.M., **Scales of variability in the southern ocean from satellite altimetry and FRAM (Fine Resolution Antarctic Model),** *SPIE—The International Society for Optical Engineering,* 1994, Vol.2319, Oceanic remote sensing and sea ice monitoring, Rome, Italy, Sep. 26, 1994. Edited by J.A. Johannessen and T.H. Guymer, p.19-30, 15 refs.

Satellite altimetry and numerical models offer two methods of studying the circulation of the remote southern ocean at a range of space and time scales. Repeated tracks of satellite altimeter data from GEOSAT and ERS-1 have been used to determine characteristic length scales of oceanic mesoscale features, and the time scales of this activity, in the Agulhas Region. The results are shown and discussed in terms of the local ocean dynamics and the differences in sampling between the two satellites. The Fine Resolution Antarctic Model is a numerical model of the southern ocean, designed to resolve mesoscale features of the circulation. A six year time series of monthly model surface dynamic heights has been sampled as if by an altimeter. These "model altimeter" data have been processed using the same methods as for real altimeter data. The spatial scales of mesoscale activity in the model were determined using the same techniques as for the real altimeter data and the results compared in order to determine the ability of the model to recreate the mesoscale activity of the regions studied. (Auth.)

See also:
A-51700 B-51658 B-51659 B-51660 B-51692 B-51703 B-51776
B-51818 B-52117 B-52118 B-52124 B-52125 B-52137 B-52161
B-52180 B-52254 B-52255 B-52259 B-52260 B-52273 B-52289
B-52311 B-52332 B-52338 B-52341 B-52363 B-52364 B-52445
B-52453 B-52473 B-52516 B-52521 B-52535 B-52558 B-52569
B-52584 B-52588 B-52679 B-52698 B-52719 B-52720 B-52728
B-52729 B-52734 B-52736 B-52737 B-52740 B-52745 B-52746
B-52779 B-52781 B-52784 B-52785 B-52794 B-52797 B-52806
B-52810 B-52830 B-52834 B-52835 B-52836 B-52869 B-52872
B-52997 B-53003 B-53006 B-53007 B-53085 B-53109 B-53167
B-53169 B-53185 B-53266 B-53277 B-53306 B-53348 B-53350
B-53409 B-53410 B-53418 B-53581 B-53598 B-53694 B-53698
B-53716 B-53744 B-53752 B-53754 B-53758 B-53776 B-53779
B-53781 B-53782 B-53783 B-53784 B-53799 B-53803 B-53805
B-53853 B-53854 B-53855 B-53858 B-53859 B-53867 B-53875
B-53876 B-53887 B-53888 B-53889 B-53900 B-53903 B-53935
B-53951 B-53967 B-53969 B-53970 B-53977 B-53978 C-51944
C-53364 D-54033 E-51756 E-51935 E-51959 E-51960 E-52030
E-52103 E-52109 E-52111 E-52112 E-52113 E-52222 E-52229
E-52244 E-52245 E-52402 E-52427 E-52536 E-52691 E-52702
E-52795 E-52972 E-52982 E-53168 E-53243 E-53247 E-53270
E-53287 E-53310 E-53727 E-53740 F-51688 F-51799 F-51842
F-52049 F-52128 F-52291 F-52426 F-52464 F-52465 F-52578
F-52607 F-52609 F-52612 F-52655 F-52658 F-52694 F-52695
F-52703 F-52704 F-52705 F-52706 F-52718 F-52753 F-52761
F-52762 F-52831 F-52870 F-52888 F-52906 F-52934 F-52935
F-52943 F-52953 F-53432 F-53476 F-53477 F-53478 F-53596
F-53797 F-53833 F-53845 F-54020 G-53557 G-53700 I-52089
I-52131 I-52459 I-52621 I-52623 I-52727 I-52757 I-52829
I-53373 I-53390 I-53444 I-53505 I-53507 I-53868 L-51781
L-51926 L-52088 L-52988

K. ATMOSPHERIC PHYSICS

K-51687

Rycroft, M.J., **Antarctica—where space meets Planet Earth,** Antarctic science: global concerns. Edited by G. Hempel, Berlin, Springer Verlag, 1994, p.31-44, 48 refs.

DLC G845.5.A54 1994

This paper gives some examples of topical problems relating to antarctic research where measurements made from satellites are complemented by observations made from the Earth's surface. The field has been restricted to studies of the atmosphere and near-Earth space environment, concentrating upon the ozone hole and solar-terrestrial physics. The several unique aspects of Antarctica for such research should be further capitalized upon in future studies.

K-51721

Xu, W.Y., **Comparative study on the ionospheric current systems in the Antarctic and Arctic regions,** *Antarctic research,* June 1994, 5(1), p.1-10, 11 refs. For Chinese original see 22K-51009.

The current systems representing the solar and lunar daily variations (S and L) of the geomagnetic field have been calculated on the basis of data obtained from the global network of geomagnetic observatories. The characteristics of these current systems in the antarctic and arctic regions have been analyzed comparatively. The results show the following: there are certain differences in the current systems of these two regions, which implies definite differences in the ionospheric dynamic processes responsible for both S and L and the field-aligned current responsible for S; there are notable differences in the internal current systems of the two polar regions, which is attributed to both the inducing field (current) and underground conductivity. In general, the conductivity of the antarctic region is higher that of the arctic region. (Auth.)

K-51734

Yang, S.F., Xiao, F.H., **Characteristics of Pc3 pulsations at Great Wall Station of Antarctica,** *Antarctic research (Chinese edition),* June 1994, 6(2), p.62-67, In Chinese with English summary. 5 refs.

In this paper Pc3 pulsations at the Great Wall Station are analyzed statistically from Aug. 16 to Nov. 20, 1990. Their occurrence frequency, frequency distribution and polarization were studied. The mechanism of excitation and propagation for Pc3 pulsations at Great Wall is investigated theoretically. (Auth.)

K-51741

Mielke, T.A., **Aspects of the magnetospheric amplification phenomenon in ducted whistler-mode waves,** Stanford University, 1993, 78p., University Microfilms order No.AAD94-14621, Ph.D. thesis. Refs. p.76-78.

Interactions between ducted whistler-mode waves and energetic particles in the magnetosphere often lead to strong wave amplification, characteristically associated with such nonlinear effects as the appearance of sidebands and triggering of free-running emissions. Experiments at Siple Station were conducted to study the growth process. Data from the experiment on antenna polarization effects on coupling of wave energy into the whistler-mode agree well with theory. Results of experiments aimed at determining the wave-particle interaction underlying the observed wave growth were consistent with a gyro-resonance interaction but not with a Landau resonance interaction. Experiments using pulses with parabolic rather than linear frequency chirps also produced wave growth, providing the capability to test theories of the effects of spatial variations on the wave growth process. A further observed phenomenon, that of a wave power threshold below which the growth and emissions effect does not occur, was also investigated. (Auth.)

K-51749

Zhen, W.M., Cao, C., Wu, J., **Analysis of the ionospheric anomaly over Great Wall Station, Antarctica,** *Antarctic research (Chinese edition),* Sep. 1994, 6(3), p.33-37, In Chinese with English summary. 6 refs.

The authors use an empirical method to derive the height of maximum electron concentration of the F_2 region and neutral meridional winds over Great Wall Station. With the HWM-90 Model, prediction of meridional winds are also calculated. Results explain two anomaly features of ionosonde data: in summer, peak values of f_0F_2 appear during night time; in winter, especially during June and July, f_0F_2 decrease dramatically compared to the summer data. The summer anomaly can be explained by combining effects of two competing causes, thermospheric winds and solar effects on the ionosphere. The high geographic latitude and middle geomagnetic latitude of Great Wall Station are important factors. (Auth.)

K-51828

Xu, D.G., Kivelson, M.G., **Polar cap field-aligned currents for southward interplanetary magnetic fields,** *Journal of geophysical research,* Apr. 1, 1994, 99(A4), p.6067-6078, Refs. p.6076-6078.

It has been common to suppose that polar region field-aligned currents for southward interplanetary magnetic fields (IMF) consist of two parts: region 1 and region 2 currents. It is often suggested that both of these current systems flow on closed field lines. In this pilot study the limited data available from the ISIS 2 satellite are used to examine region 1 currents with the objective of establishing whether or not they can exist partially on open field lines (i.e., inside the polar caps) for southward IMF. Magnetic field perturbations were used to identify the field-aligned currents (FACs). It is suggested that in the presence of southward IMF, region 1 currents can be composed of two parts, one flowing on closed field lines and one flowing on open field lines. Because the portion of the region 1 currents inside the polar caps may be generated by different processes from the portion on closed field lines, the authors refer to the region 1 currents on open field lines as R1O currents. The region 1 currents on closed field lines may be called R1C currents. Data from both polar regions are included. (Auth. mod.)

K-51829

Rodger, A.S., et al, **New mechanism for polar patch formation,** *Journal of geophysical research,* Apr. 1, 1994, 99(A4), p.6425-6436, Refs. p.6435-6436.

Polar patches are regions within the polar cap where the F-region electron concentration and airglow emission at 630 nm are enhanced above a background level. Previous observations have demonstrated that polar patches can be readily identified in Polar Anglo-American Conjugate Experiment (PACE) data. Here, PACE data from Halley Station and those from complementary instruments from two other antarctic stations are used to show that some polar patches form in the dayside cusp within a few minutes of the simultaneous occurrence of a flow channel event (short-lived plasma jets of ca. 2 km/s) and azimuthal flow changes in the ionospheric convection pattern. The latter are caused by variations of the y-component of the interplanetary magnetic field. The physical processes by which these phenomena cause plasma enhancements and depletions in the vicinity of the dayside cusp and cleft are discussed. Subsequently, these features are transported into the polar cap where they continue to evolve. (Auth. mod.)

K-51835

Nishitani, N., Hough, G., Scourfield, M.W.J., **Spatial and temporal characteristics of giant undulations,** *Geophysical research letters,* Dec. 1, 1994, 21(24), p.2673-2676, 7 refs.

A giant undulation event observed at SANAE Station is reported. During the event the geomagnetic activity was high, as was the case in previously reported observations of giant undulations. Data were recorded by all-sky and small field-of-view TV cameras, from 2346 UT on Sep. 10 to 0007 UT on Sep. 11 (MLT about 2200 h), 1987. The fine temporal and spatial resolution of the TV data made a detailed study of the undulation possible. The average wavelength was 170 km and the amplitude of the wave increased from 70 km to 140 km in 10 minutes. Wave propagation, measured at different positions on the undulation, was duskward with a phase speed of 540 to 650 m/s. An inner structure, propagating at a speed of 2.5 to 4.0 km/s, about 3 times as fast as the undulation form, was observed just poleward of the undulation boundary, indicating the presence of strong velocity shear. The linear theory of the velocity shear instability is examined as a possible generation mechanism on the basis of these observations. (Auth.)

K-51858

Ramadurai, S., **Very long time variations of cosmic ray intensity and their origin,** *Advances in space research,* Jan. 1995, 15(1), Galactic cosmic ray heavy ions. Proceedings of the Topical Meeting of the COSPAR Interdisciplinary Scientific Commission E (Meeting E7) of the COSPAR Twenty-Ninth Plenary Meeting, Washington, D.C., Aug. 28-Sep. 5, 1992. Edited by S. Biswas and S. Ramadurai, p.(1)41-(1)48, 22 refs.

A large number of sources contribute to cosmic rays in the Galaxy. By studying time profiles of cosmic ray intensity over a very long time, it is hoped to get some information about a possible source. In this respect, long-lived radioisotopes like ^{10}Be and ^{14}C, produced by cosmic ray interactions in the Earth's atmosphere, carry information on the long-term variations in the local cosmic ray intensity. The record of ^{10}Be concentrations in the Vostok ice core in Antarctica over the past 100 Kyr displays several steep and relatively brief increases. An increase at about 35 Kyr is attributed to increase in cosmic ray intensity arriving at the Earth. This increase is interpreted as due to the arrival of the shock-front from the recently discovered gamma ray and X-ray pulsar, Geminga. Thus a direct connection between a non-solar cosmic ray source and the resultant increase in the cosmic ray intensity at the Earth is established for the first time. It is suggested that the ^{26}Al intensity in the local interstellar bubble should be doubled as a result of this source. (Auth.)

K-51859

Jones, D.L., **Direct imaging of planetary systems with a ground-based radiotelescope array,** *Astrophysics and space science,* 1994, 212(1-2), Planetary Systems: Formation, Evolution, and Detection, Pasadena, CA, Dec. 1992, Proceedings. Edited by B.F. Burke, J.H. Rahe, and E.E. Roettger, p.391-394, 9 refs.

The National Radio Astronomy Observatory's proposed Millimeter Array (MMA) will bring unprecedented sensitivity, angular resolution, and image dynamic range to the millimeter wavelength region of the spectrum. An obvious question is whether such an instrument could be used to detect planets orbiting nearby stars. The techniques of aperture synthesis imaging developed for centimeter wavelength radio arrays are capable of producing images whose dynamic ranges greatly exceed the brightness ratio of a solar-type star and a Jupiter-like planet at submillimeter or millimeter wavelengths. The angular resolution required to separate a star and planet at a few pc distance can be obtained with baselines of several km. The greatest challenge is sensitivity. At the highest possible observing frequencies, about 300 GHz for typical high, dry sites, and about 900 GHz from the antarctic plateau, the proposed MMA will be able to detect the thermal emission from a Jupiter-like planet a few pc distant. An upgraded MMA operating near 300 GHz with twice the currently proposed number of antennas, a 20% fractional bandwidth, and improved receivers could detect Jupiter at 4 pc in a few months. Building such an array on the antarctic plateau and operating at ca. 900 GHz would allow a Jupiter at 4 pc to be detected in approximately one day of observing time.

K-51987

Klain, B.I., Kurazhkovskaia, N.A., Dobnia, B.V., **Relationship between the theta aurora and ULF emissions at high latitudes,** *Polar geography and geology,* Apr.-June 1994, 18(2), p.168-174, Translated from Antarktika, No.32, 1993. 12 refs.

Variations in the electromagnetic emission accompanying the appearance of theta aurora in the magnetosphere polar regions were studied. It is shown that modulated LF emissions appear within the range of 0.02-2.35 Hz, where the characteristic modulation period is ≈30 min during a theta aurora at the latitude of the dayside cusp. These emissions precede the development of the transpolar arc in the night area of the polar cap by 15-30 min. The revealed effect may be explained by the development of a reconnection process in the cusp region when $B_z>0$, and subsequent reconfiguration of the magnetospheric tail. (Auth. mod.)

K-52014

Cazeneuve, H., **Absorption and geomagnetic processes in the polar ionosphere** [Procesos geomagnéticos y de absorción en la ionosfera polar], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1994, No.404, 33p., In Spanish with English summary. 11 refs.

Results from simultaneous observations of ionospheric absorption and geomagnetic disturbances, obtained at Belgrano and San Martin stations, are presented. The location of these stations is adequate for this study, since they are under different regimes of magnetospheric activity. Common and deviant features are revealed by cross-correlation techniques and spectral analysis. Dynamical spectra, computed by sliding the analysis interval every 15 min, provided a good spectral characterization of geomagnetic and absorption events. Three distinct spectral bands were found, which reveal a different level of absorbed or released power over discrete frequency intervals. The observation of cyclical variations of the spectral parameters is another significant result. Differences in the annual and seasonal variations found at both stations are explained in terms of the drift of convection electric fields, which accelerate substorm electrons. (Auth. mod.)

K-52031

Crickmore, R.I., **Mean thermospheric winds observed from Halley, Antarctica,** *Annales geophysicae,* Nov. 1994, 12(10/11), p.1101-1113, 24 refs.

Thermospheric winds on a total of 237 nights have been studied for the effects due to geomagnetic activity, solar flux, and season. The observations were made from 1988 to 1992 by a Fabry-Perot interferometer (FPI) operating at Halley Station. This is the first statistical study of thermospheric winds near the southern auroral zone. The main factor affecting the wind velocities is the geomagnetic activity. Increases in activity cause an increase in the maximum equatorward wind, and cause the zonal wind in the evening to become more westerly. Smaller changes in the mean wind occur with variations in season and solar flux. Comparisons with predictions of the Vector Spherical Harmonic Model (VSH) show that for low geomagnetic activity the predicted phases of the two components of the wind closely resemble the observations but the modelled amplitudes are too small by a factor of two. At high geomagnetic activity the major differences are that modelled zonal velocity is too westerly in the evening and too easterly after 04 UT. The modelled ion densities at the F-region peak are a factor of up to 9 too large, whilst the predicted mean value and diurnal variation of the altitude of the peak are significantly lower than those observed. It is suggested that these differences result from the ion loss rate being too low, and an inaccurate model of the magnetic field. (Auth. mod.)

K-52033

Balmforth, H.F., Clilverd, M.A., Smith, A.J., **Case study of storm commencement and recovery plasmaspheric electric fields near *L*=2.5 at equinox,** *Annales geophysicae,* Aug. 1994, 12(7), p.625-635, 16 refs.

Data from the VLF Doppler experiment at Faraday Station are used to study the penetration of the high-latitude convection electric field to lower latitudes during severely disturbed conditions. Alterations of the electric field at *L*-values within the range 2.0-2.7 are studied for two cases at equinox (Sep. 10-12 and May 1-3, 1986). The recovery of the electric field is found to be approximately an exponential function of time. Values for the equatorial meridional $E \times B$ drift velocity, inferred from the data, are used as inputs to a model of the plasmasphere and ionosphere. The model and experimental results are used to investigate the post-storm alteration of ionospheric coupling processes. The magnitude of the effect of ionosphere-plasmasphere coupling fluxes on N_mF2 values and the O^+-H^+ transition height is dependent on the local time of storm commencement, and on the orientation of the electric field. The coupling fluxes appear to have a maximum influence on ionospheric content during the main phase of geomagnetic activity that produces outward motion of plasmaspheric whistler data. (Auth. mod.)

K-52034

Rodger, A.S., Pinnock, M., Dudeney, J.R., Waterman, J., De la Beaujardiere, O., Baker, K.B., **Simultaneous two hemisphere observations of the presence of polar patches in the nightside ionosphere,** *Annales geophysicae,* Aug. 1994, 12(7), p.642-648, 26 refs.

The presence of polar patches as observed simultaneously in the same magnetic meridian of opposite nightside ionospheres by coherent and incoherent scatter radars are described. The patches appear to be related to variations either in the B_z or B_y component of the interplanetary magnetic field which cause transient merging on the dayside magnetopause. The passage and characteristics of polar patches as they traverse the polar cap into the nightside auroral oval are not significantly affected by the occurrence of small substorms. This study illustrates how the observations of polar patches in the nightside high-latitude ionosphere could be of great value in determining their formation process. (Auth.)

K-52039

Kikuchi, T., Yamagishi, H., **Drift of auroral absorption observed with a scanning beam riometer at Syowa Station,** *Journal of the Communications Research Laboratory,* Mar. 1990, 37(150), p. 1-14, 16 refs.

The scanning beam riometer at Showa Station detects north-south (N-S) and east-west (E-W) movement of auroral absorptions with a time resolution of 10 sec and spatial resolution of 10 km at the ionospheric height. It is shown that auroral absorptions drift eastward in the post-midnight to pre-noon sectors, and drift westward in the noon to pre-midnight sectors, with speeds ranging from 60 to 700 m/s. The E-W drift direction is reversed around the 10 MLT sector where the drift direction is poleward. The E-W drift direction is also reversed in the pre-midnight sector where the drift is equatorward. This local time dependence of the absorption drift coincides with the ionospheric projection of the magnetospheric convection deduced from IS radar and balloon observations. The fact that the eastward (westward) drift corresponds to the negative (positive) geomagnetic H deflection with respect to the quiettime level strongly suggests that the magnetospheric source region for the energetic electron precipitation drifts due to the E x B drift. It is inferred that the auroral absorption is spatially elongated in the form of a belt. The width of a typical absorption belt ranges from 30 to 60 km. The observed belt-shaped auroral absorption suggests the existence of a sheet-like structure of magnetospheric plasma, where the pitch angle diffusion causes the precipitation of energetic electrons responsible for the auroral absorption. (Auth.)

K-52095

Yearby, K.H., Smith, A.J., **Polarisation of whistlers received on the ground near** ***L*****=4,** *Journal of atmospheric and terrestrial physics,* Sep. 1994, 56(11), p.1499-1512, Refs. p.1511-1512.

The observed polarization of the horizontal magnetic components of whistler mode signals received at Halley Station (L=4.3) is in many cases that expected from a simple model of the trans-ionospheric and sub-ionospheric propagation in the Southern Hemisphere, i.e. right-hand elliptical (field vectors rotate clockwise, looking towards the source) for ionospheric exit points close to the receiver, tending towards linear for more distant exit points. This suggests it may be possible to use the observed polarization to estimate the propagation distance. However, in other cases, in certain frequency ranges, left-hand elliptically polarized signals have been observed. More realistic models do predict polarization reversals at certain frequencies and exit point to receiver distances, but not over such a wide frequency range as has sometimes been observed. Also, in some cases, signals with nearly right-hand circular polarization have been observed for exit points at large distances where linear polarization would be expected. (Auth.)

K-52176

Kato, K., Sato, N., Tonegawa, Y., **Estimation of geomagnetic conjugate points using Pc5 geomagnetic pulsation,** *Journal of geomagnetism and electricity,* 1994, 46(5), p.363-372, 22 refs.

Pc5 pulsation data were obtained simultaneously at three coordinated stations in Iceland and at three stations in Antarctica, including Showa Station, for the months of Mar. and May in 1988. In this analysis, it was assumed that Pc5 pulsations have a form of odd mode standing oscillations of the geomagnetic field line with linear phase shifts among the stations in the horizontal plane. Conjugate points were calculated uniquely. The statistical result showed that conjugate points of Showa Station estimated from the Pc5 events were concentrated around the conjugate points in Iceland calculated from the magnetic field model of Tsyganenko (1987) within the range of 66-68° in latitude, and 70-76° in longitude, i.e., less than 1/5 wavelength. (Auth.)

K-52279

Zhen, W.M., Cao, C., Wu, J., **Analysis of the ionospheric anomaly at Great Wall Station, Antarctica,** *Antarctic research,* Dec. 1994, 5(2), p.53-57, 3 refs. For Chinese original see 23K-51749.

The authors use an empirical method to derive the height of maximum electron concentration of the F_2 region and neutral meridional winds over Great Wall Station. Using the HWM-90 Model, prediction of meridional winds are also calculated. Results explain two anomaly features of ionosonde data: in summer, peak values of f_0F_2 appear during night time; in winter, especially during June and July, f_0F_2 decreases dramatically compared to summer. The summer anomaly can be explained as combined effects of two competing causes: thermospheric winds and solar effects on the ionosphere. (Auth. mod.)

K-52286

Liu, R.Y., Liu, S.L., **Observations of solar- terrestrial physics in Antarctica,** *Antarctic research (Chinese edition),* Dec. 1994, 6(4), p.43-58, In Chinese with English summary. 7 refs.

Past and present research activities, based on the premise that Antarctica is a unique location for solar- terrestrial physics observations, are reviewed. Trends and future prospects for international cooperation in this field of research are discussed. (Auth. mod.)

K-52350

Singh, J., Nagabhushana, B.S., Babu, G.S.D, Uddin, W., **Study of calcium-K network evolution from Antarctica,** *Solar physics,* Aug. 1994, 153(1-2), p.157-167, 14 refs.

To study the evolution of large convective cells known as supergranules, a solar telescope was set up at Maitri Station in Antarctica during the local summer months (Dec. 1989 through Mar. 1990). A continuous sequence of calcium K-line filtergrams for 106 hours spaced at intervals of about 10 min was obtained. Analysis of the data indicates that the most probable lifetime of the calcium-K network is about 22 hours. The lifetime depends upon the size of the cell and is larger for bigger cells. The data also show that cells of a given size associated with remanent magnetic field regions live longer than those in the field-free region. This may mean that the magnetic field plays an important role in the confinement of these structures. (Auth.)

K-52372

Kadokura, A., ed, **World Data Center C2 for Aurora. Data catalogue No.5,** Tokyo, National Institute of Polar Research, 1995, 173p.

The World Data Center (WDC) C2 for Aurora, established in 1981, is responsible for data archiving and dissemination of all-sky camera observations, visual observations, other optical observations (such as TV and photometric observations), auroral image and particle observations from satellites, geomagnetic observations, and observations of upper atmosphere phenomena associated with aurora such as ULF, VLF and CNA activities. This Data Catalogue summarizes the collection of data sets, data books, related publications and facilities available at WDC-C2 for Aurora as of Feb. 1995. A list and map show the location of antarctic upper atmosphere physics stations; geomagnetic parameters are calculated with actual station heights for the epoch of 1995.

K-52481

Smith, A.J., **VELOX: a new VLF/ELF receiver in Antarctica for the Global Geospace Science mission,** *Journal of atmospheric and terrestrial physics,* Apr. 1995, 57(5), p.507-524, 41 refs.

VELOX (VLF/ELF Logger Experiment), a new facility for systematically studying the characteristics of magnetospherically generated ELF/VLF radio noise received at a high-latitude ground station (Halley, Antarctica) measures continuously at 1 s resolution the absolute power (peak, mean, and minimum), arrival azimuth, and polarization ellipticity in 8 logarithmically spaced frequency bands ranging from 500 Hz to 9.3 kHz. All filtering etc. is done in real time using digital signal processing (DSP) techniques. Key parameters for each day are extracted and regularly transferred to the Global Geospace Study Central Data Handling Facility. Data from the first year of operation (1992) show that, whilst the upper channels (6 kHz and 9.3 kHz) are dominated by thunderstorm (sferic) noise, which is strongest at night and repeatable from day to day, magnetospheric chorus and hiss emissions are more important in the 1-4 kHz range of high attenuation in the Earth-ionosphere waveguide. Three classes of event are usually observed during specific local time sectors: substorm-related chorus events in the midnight-dawn sector, dawn chorus, and hiss-like events in the afternoon; all may occasionally be completely absent on quiet days. (Auth. mod.)

K-52504

Candidi, M., Cerulli-Irelli, P., Rossi, L., **AGONET program,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.351-361, 4 refs.

AGONET (Antarctic Geospace Observatory NETwork) is a network of antarctic observatories devoted to measurement of geospace parameters which are important in the field of ionosphere-magnetosphere coupling. The observatories will include those sites where appropriate instrumentation is already in operation, or is planned for installation. Other sites to uniformly cover an appropriate grid will be instrumented with automatic observatories which are already planned by several national programs (USA, UK, Japan). A detailed description of the program is presented. (Auth. mod.)

K-52505

De Santis, A., Chiappini, M., **Chaos and fractal behaviour of the geomagnetic field over polar caps: some preliminary results,** Italian Research on Antarctic Atmosphere, Conference proceedings. Vol.45, Bologna, Italian Physical Society, 1994, p.363-369, 12 refs.

Geomagnetic field variations in Antarctica can be analyzed by means of fractal and chaotic techniques. Comparisons with corresponding recordings at a medium latitude observatory show distinct behavior either in the time domain or in phase-space. The time evolution of an antarctic substorm can be interpreted with deterministic chaos, having some analogies with Brownian motion statistics. (Auth.)

K-52510

Ruzmaikin, A.A., Feynman, J., Goldstein, B.E., Smith, E.J., **Intermittent turbulence in solar wind from the south polar hole,** *Journal of geophysical research,* Mar. 1, 1995, 100(A3), p.3395-3403, 28 refs.

The magnetic fields measured by the Ulysses spacecraft were used to study solar wind turbulence in the fast solar wind from the south polar hole. The spacecraft was at about 46° south latitude and 3.9 AU. To permit a better comparison of the observations with the theoretical models, the structure characteristics of the data are analyzed. Exponents of the second-order structure functions (power spectra) and the higher-order normalized structure functions for the components of the magnetic fields can be approximately described by two basic numbers: the spectral exponent and the intermittency exponent. The intermittency exponent characterizes correlation properties of the energy cascade from large to small scales. The measured spectral indices are reduced according to a simple model for Alfvén turbulence and compared with second-order spectral theory. The reduced spectral indices for the period range of 1 min to about a half hour are remarkably constant and in good agreement with the value of 3/2. The tentative conclusion is that the high-frequency turbulence appears to agree with the model of random-phased Alfvén waves. (Auth. mod.)

K-52511

Anderson, H.M., Engebretson, M.J., Arnoldy, R.L., Cahill, L.J., Jr., Newell, P.T., **Statistical study of hydromagnetic chorus events at very high latitudes,** *Journal of geophysical research,* Mar. 1, 1995, 100(A3), p.3681-3692, 26 refs.

Hydromagnetic (HM) chorus events are ULF waves with typical frequencies from 0.2 to 0.6 Hz; their frequency-time spectrum consists of a combination of band-limited unstructured emissions and discrete elements. These waves are one of a class of short-period ULF emissions (in the Pc 1 and 2 frequency range) that may be of value in ground-based identification of the footprint of magnetospheric boundary regions. As part of an extensive survey of Pc 1 and 2 waves at very high latitudes, the authors have identified all occurrences of HM chorus in nearly a full year's data from South Pole Station and McMurdo during 1990, and at McMurdo and Søndre Strømfjord, Greenland during 1988. In agreement with previous studies, these events tend to occur within a few hours of local noon. Study of particle boundary data indicated that the events reported here occurred during conditions of extremely contracted auroral ovals and are thus also consistent with an outer dayside magnetospheric source region. However, the occurrence of HM chorus events in this high-latitude data set was limited to the months of Oct. through May, with an occurrence peak in Feb., and no events were found in the months of July through Sep. in either of the years studied. This suggests not a seasonal variation (with late winter minimum) but rather an apparent annual variation. (Auth. mod.)

K-52585

Conde, M., Dyson, P.L., **Thermospheric vertical winds above Mawson, Antarctica,** *Journal of atmospheric and terrestrial physics,* May 1995, 57(6), p.589-596, 18 refs.

High-resolution night-time Fabry-Perot spectra of the λ630 nm OI thermospheric airglow emission obtained from Mawson, Antarctica, during the austral winter of 1992 have been used to provide estimates of thermospheric temperature and neutral wind. In this paper, the authors report on characteristics of the resulting vertical wind estimates. The final data set comprised 103 observing nights between Mar. 18 and Sep. 20 for a total of 2096 useable zenith spectra. Because the instrumental reference rest wavelength of the λ630 nm emission is not known, this experiment was only capable of measuring vertical wind variations relative to an arbitrarily-chosen reference velocity. For this work, the authors established their reference by requiring that the nightly mean vertical wind be zero. They have divided the data into two subsets, corresponding to days of quiet and moderately disturbed magnetic activity. In both cases, the mean daily variation in vertical wind velocity was dominated by its diurnal component. (Auth. mod.)

K-52586

Smith, R.W., Hernandez, G., **Vertical winds in the thermosphere within the polar cap,** *Journal of atmospheric and terrestrial physics,* May 1995, 57(6), p.611-620, 13 refs.

Vertical winds measured in the upper and lower thermosphere above Amundsen-Scott Station show a predominantly diurnal variation with an average amplitude of 40 m/s and 10 m/s, respectively. Downward motion was typical of the dayside polar cap in the vicinity of the cusp and cleft, and upward motion of about the same magnitude occurred in the midnight sector. Observations during the June 1991 storm period showed that the amplitude of diurnal variation was well correlated with the daily sum of K_p or σK_p, and also that the downward wind was the most sensitive to K_p change. Vertical winds in excess of 150 m/s were observed on the most active day. These measurements bear strong similarities to vertical wind data from Longyearbyen, Svalbard, at a similar geomagnetic latitude in the Northern Hemisphere. (Auth. mod.)

K-52620

Crickmore, R.I., **Study of the thermospheric forces at a high latitude site on two days of differing geomagnetic activity,** *Journal of atmospheric and terrestrial physics,* June 1995, 57(7), p.759-773, 34 refs.

Data from a Fabry-Perot interferometer and Dynasonde at Halley Station have been used to calculate the forces acting on the high latitude thermosphere. Two case studies of the forces have been undertaken to study why the thermospheric zonal wind speeds are typically so different on nights with different geomagnetic activity. One case study analyses the forces on a geomagnetically active night and the other analyses them on a geomagnetically quiet night. Even on the geomagnetically active night, it is found that the ion drag force is not necessarily the largest force at any given time. Simple comparison of the magnitudes of the forces does not make it very clear which ones dominate in controlling the motion of the thermosphere. This can be seen more clearly by rewriting the momentum equation so that the neutral velocity is expressed in terms of the ion velocity, and the other forces normalized by the ion density. It then becomes clear that, in the evening, the differences in the neutral velocity are due to increases in both ion density and ion velocity, while in the morning, only changes in ion density are important. (Auth. mod.)

K-52791

Bering, E.A., III, et al, **Balloon measurements above the South Pole: study of ionospheric transmission of ULF waves,** *Journal of geophysical research,* May 1, 1995, 100(A5), p.7807-7819, 47 refs.

The authors report an experimental study of the Hughes and Southwood model of the transmission of electromagnetic signals from the ionosphere/magnetosphere to the lower atmosphere. The electric field data were obtained from one of eight high-latitude balloon payloads launched above the pole during the South Pole Balloon Campaign in the 1985-86 austral summer. The magnetic field data are from the South Pole magnetometer. The balloon payloads were instrumented with double-probe electric field detectors and bremsstrahlung X ray detectors. One of the events from flight 7 had an amplitude in the range of 10-20 mV/m and a period of several minutes. In the magnetosphere, the wave was probably an Alfvén mode. The wave event was superimposed on background fluctuations that can be attributed to turbulence. The results agree with the predictions of the model in that the best coherence is observed between parallel components of E versus B. (Auth. mod.)

K-52792

Gundersen, J.O., et al, **Degree-scale anisotropy in the cosmic microwave background: SP94 results,** *Astrophysical journal,* Apr. 20, 1995, 443(2, Part 2), p.L57-L60, 22 refs.

Results are presented from two observations of the cosmic microwave background (CMB) performed from the South Pole during the 1993-94 austral summer. Each observation employed a 3° peak-to-peak sinusoidal single-difference chop and consisted of a 20° x 1° strip on the sky. The first observation used a receiver which operated in three channels between 38 and 45 GHz (Q-band) with a FWHM beam which varies from 1° to 1.15°. The second observation overlapped the first and used a receiver which operates in four channels between 26 and 36 GHz (Ka-band) with a FWHM beam from 1.5° to 1.7°. Significant correlated structure is observed in all channels for each observation. The spectrum of the structure is consistent with a CMB spectrum and is formally inconsistent with diffuse synchrotron and free-free emission at the $5\ \sigma$ level. The amplitude of the structure is inconsistent with 20 K interstellar dust; however, the data do not discriminate against flat or inverted spectrum point sources. (Auth. mod.)

K-52815

Cazeneuve, H., **Interplanetary sources of geomagnetic activity at high latitudes** [Fuentes interplanetarias de la actividad geomagnética en altas latitudes], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1994, No.432, 24p., In Spanish with English summary. 15 refs.

A study of a large body of geomagnetic data from 10 antarctic stations reveals the existence of clearly defined periods of activities which are closely linked to polarity reversals of the interplanetary magnetic field. These periods are reliable indicators of a penetration of substorm energy into the magnetosphere at each crossing of the heliospheric current sheet. The examination of the series of geomagnetic data permits one to identify three types of activity, according to their dependence on interplanetary events. (Auth. mod.)

K-52849

Stening, R., Fleming, K., Fraser, G., **Upper atmosphere semidiurnal tides at Christchurch (44S) and Scott Base (78S),** *Journal of atmospheric and terrestrial physics,* July 1995, 57(8), p.857-869, 17 refs.

Lunar and solar semidiurnal tides have been determined from wind measurements in the 82 to 100 km height range at Christchurch and Scott Base made during 1983-84. At Christchurch, the solar tide has maximum amplitudes in Apr. and Dec., while at Scott Base only the Dec. maximum is present at all heights. Phases at Scott Base mostly agree with those measured earlier at Mawson, but vertical wavelengths are always long. The lunar tide was difficult to isolate at Christchurch, but the winter to summer phase reversal was clear. This was also seen at Scott Base. (Auth.)

K-52850

Leonard, J.M., Pinnock, M., Rodger, A.S., Dudeney, J.R., Greenwald, R.A., Baker, K.B., **Ionospheric plasma convection in the Southern Hemisphere,** *Journal of atmospheric and terrestrial physics,* July 1995, 57(8), p.889-897, Refs. p.895-897.

The first ionospheric plasma convection maps ordered by the *y*- and *z*-components of the IMF using only data from the Southern Hemisphere are presented. These patterns are determined from line-of-sight velocity measurements of the Polar Anglo-American Conjugate Experiment (PACE) located at Halley Station, with the majority of the observations coming from 65-75° magnetic latitude. For IMF Bz positive and negative conditions, the observed plasma motions are consistent with a standard two-cell pattern. For periods from dusk through midnight to dawn, flow speeds are at least twice as large for Bz negative component as for Bz positive. The observations about noon are significantly different from each other. For Bz positive, little ordered plasma motion is observed. For Bz negative, there are large anti-sunward flows the orientation of which is ordered by IMF By. These By oriented flows are consistent with theoretical predictions, and are anti-symmetric to those reported from the Northern Hemisphere. (Auth. mod.)

K-52851

Ul'ev, V.A., Shirochkov, A.V., Moskvin, I.V., Hargreaves, J.K., **Midday recovery of the polar cap absorption of 19-21 March 1990: a case study,** *Journal of atmospheric and terrestrial physics,* July 1995, 57(8), p.905-915, 16 refs.

The effect of the midday recovery of absorption (MDR) during the polar cap absorption (PCA) of Mar. 19-21, 1990 is investigated using data from 25 riometer stations in both hemispheres. The measured variations of absorption are compared with those calculated from a model. Three main aspects are considered: the solar and geophysical conditions under which the effect appears; the essential morphological features of the phenomenon; and the relative contribution of diurnal variations in the geomagnetic cut-off energy and an anisotropic pitch-angle distribution of the solar protons to the development of the MDR. There are solid reasons to suggest that MDR at latitude 65-70° is due to the combined influence of a diurnal variation of geomagnetic rigidity and the pitch-angle anisotropy of solar protons. The MDR at lower latitudes (Λ=60-65°) seems to be produced primarily by diurnal variations of the cut-off rigidity. (Auth. mod.)

K-52852

Barr, R., **Simple theoretical model for computing omega navigation errors near Antarctica,** *Journal of atmospheric and terrestrial physics,* July 1995, 57(8), p.961-966, 13 refs.

The propagation of VLF signals around a model icecap has been computed using Kirchhoff diffraction theory. The antarctic continent has been modelled as a spherical cap, whose pole is coincident with that of the South Pole, which totally absorbs VLF radio waves propagating over it. Using this simple model, the range errors expected whilst travelling between Antarctica and New Zealand, on signals from Omega La Reunion and Argentina, have been calculated and compared with recently derived measurements. In order to model the measured range errors accurately it has been necessary to modify the simple spherical cap model to that of a semi-circular spherical cap, producing what is effectively knife edge diffraction. To 'best fit' the data, the northernmost limit of the spherical cap has been found to be 66.1°S for propagation from La Reunion and 75°S for propagation from Argentina. These model icecaps agree well with the northernmost boundary of the antarctic continent where signals from Omega La Reunion and Argentina graze it tangentially. (Auth.)

K-52976

Dudeney, J.R., Rodger, A.S., Smith, A.J., Jarvis, M.J., Morrison, K., **Satellite Experiments Simultaneous with Antarctic Measurements (SESAME),** *Space science reviews,* Feb. 1995, 71(1-4), p.705-742, Refs. p.739-742.

Satellite Experiments Simultaneous with Antarctic Measurements (SESAME) is one of the four ground-based programs within the NASA/ISAS Global Geospace Science (GGS) mission. The scientific objectives of SESAME are carefully selected to make an invaluable contribution to the GGS mission by capitalizing on the unique geophysical advantages of Antarctica for geospace research. These arise mainly from the large displacement of the geographic and geomagnetic poles. Specifically, SES-

AME is designed to study the ionospheric effects of merging at the magnetopause, reconnection in the geomagnetic tail and its relationship to substorms, mapping of significant geospace boundaries to ionospheric altitudes, plasma wave generation and propagation at high latitudes, and ionosphere-thermosphere interactions. The experimental program is centered at Halley Station but also uses automatic geophysical observatories located poleward of Halley. The data products that will be supplied as key parameters to the GGS experiments on a routine basis are described. (Auth. mod.)

K-52991

Sivjee, G.G., Walterscheid, R.L., **Six-hour zonally symmetric tidal oscillations of the winter mesopause over the South Pole Station,** *Planetary and space science,* June 1994, 42(6), p.447-453, Refs. p.452-453.

Four complete cycles of a 6-h quasi-monochromatic variation in OH Meinel (3,1) and (4,2) band airglow brightness (I) and rotational distribution temperature (T) were observed with a near infrared (1.0-1.7 μ) Michelson interferometer operating at Amundsen-Scott Station. The simultaneous occurrence of a quasi-periodic variation in I and T suggests the presence of a coherent wave phenomenon in the mesopause. A power spectral density analysis of a continuous 24-h recording of I and T on May 24, 1992 indicates a 6±1-h period oscillation. Unlike the globally dominant migrating tides, and other zonally propagating tides, for which the quantities that generate airglow fluctuations vanish at the pole, the 6-h zonally symmetric standing tide has its maximum amplitude in these quantities at the poles. To examine whether observed airglow variations were consistent with a zonally symmetric non-migrating tide, comparisons with airglow theory were made in terms of Krassovsky's ratio. The observed value was 9±3 for amplitude and 30°±15° for phase, with I leading T. The agreement with the predicted amplitudes is good for modes which are sharply peaked near the pole. (Auth. mod.)

K-53002

Miller, T.C., **Feasibility tests and design of AMANDA (Antarctic muon and neutrino detector array),** Berkeley, University of California, 1993, 246p., University Microfilms order No. 94-30611, Ph.D. thesis. Refs. p.239-244.

The AMANDA (Antarctic Muon and Neutrino Detector Array) is a large area, high-energy neutrino detector whose primary purpose is the identification of astrophysical sources of very high energy neutrinos. AMANDA will consist of 10 vertical strings of downward-facing 20 cm photomultiplier tubes (PMTs), located in clear antarctic ice at 1 km depth. Neutrinos will be detected indirectly via Cerenkov light emitted in ice by muons produced in neutrino interactions below the array. The incident neutrino direction will be determined from the timing and pulse height information in many PMTs. The author first reviews potential astrophysical high energy neutrino point sources. Second, he describes the planned AMANDA array, including detailed descriptions of hardware, electronics, and data acquisition, and then describes experimental results on AMANDA to date. The feasibility of the AMANDA project depends critically upon the optical clarity of antarctic ice. Measurements of ice transparency at 200 m depth in Greenland during 1990 and at 800 m depth at the South Pole during the 1991-92 and 1992-93 austral summers were consistent with the peak optical attenuation length of 25 m that has been measured in laboratory ice. (Auth. mod.)

K-53096

Cao, C., Wu, J., Zhu, M.H., Zhen, W.M., Wang, S.L., **High-latitude phenomena shown by ionogram observed at Zhongshan Station in Antarctica,** *Antarctic Research (Chinese edition),* Mar. 1995, 7(1), p.50-58, In Chinese with English summary. 9 refs.

Ionograms obtained in the polar cusp region at Zhongshan Station show a number of high-latitude phenomena: the auroral oval; the FLIZ phenomenon; slant Es phenomenon and lacuna; the F region magnetic noon; and particle precipitation effects in the E region. (Auth. mod.)

K-53102

Yamazaki, I., Takahashi, Y., Mineno, H., Kamata, M., Ogawa, Y., Kadokura, A., **Upper atmosphere physics data obtained at Syowa Station in 1992,** *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1995, No.205, 208p., 15 refs.

This report summarizes upper atmosphere physics data acquired by the Upper Atmosphere Physics Monitoring (UAPM) System at Showa Station in 1992. The items of observations are as follows: geomagnetism; ELF-VLF waves; ionosphere (cosmic noise absorption at 30 MHz); and aurora. An outline of the system, specifications of the observation instruments, the recording periods, and the format of the compiled digital data are included. Summary plots for Jan. 1-Dec. 31, 1992 are appended.

K-53131

Miyaoka, H., ed, NIPR Symposium on Upper Atmosphere Physics, 17th, Tokyo, Dec. 14-15, 1993, **Proceedings of the NIPR Symposium on Upper Atmosphere Physics, No.8,** Tokyo, National Institute of Polar Research, Mar. 1995, 76p., Refs. passim. For selected papers see K-53132 through K-53135.

This volume contains 9 selected scientific papers among 72 individual contributions presented at the 17th Symposium on Coordinated Observations of the Ionosphere and the Magnetosphere in the Polar Regions, held in Tokyo on Dec. 14-15, 1993. One full length paper and three extended abstracts are pertinent to Antarctica and deal with proton aurora dynamics, the Polar Patrol Balloon project, VHF auroral radar system and the study of the upper middle atmosphere.

K-53132

Takahashi, Y., Okano, S., Ono, T., Fukunishi, H., **Imaging and photometric observations of proton aurora dynamics at Syowa Station, Antarctica,** NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.8, Tokyo, National Institute of Polar Research, Mar. 1995, p.1-6, 6 refs.

Using auroral data obtained with a multicolor all-sky imaging system (MAIS) and a tilting-filter photometer at Showa Station, the authors investigated the dynamics of proton auroras (Hβ emissions) and its relation to electron aurora dynamics. An all-sky SIT camera was also operated to monitor electron auroras. Some 4300 proton aurora images were obtained with MAIS on 29 nights from May to Sep. 1992. These data cover the magnetic local time sector from 14 h to 4 h and include various types of proton auroras in different substorm phases. It is found that when bright N-S auroras are seen in the bulge formed in an auroral breakup event, the region of proton aurora contracts poleward as the electron aurora in the bulge fades out; when there are no N-S auroras in the bulge, the proton aurora remains equatorward. (Auth.)

K-53133

Ejiri, M., et al, **Experimental results of Polar Patrol Balloon project in Antarctica. (Extended abstract),** NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.8, Tokyo, National Institute of Polar Research, Mar. 1995, p.60-64, 9 refs.

A long-term circumpolar balloon experiment, the Polar Patrol Balloon (PPB) project, aims at establishing a PPB system to carry scientific payloads into the stratosphere over the antarctic region. Six PPB experiments were planned and carried out from 1990 to 1993 as an antarctic STEP project. PPB 1 accomplished a complete circumpolar flight over Antarctica. The 2nd flight was launched on Jan. 5, 1991 to make measurements of auroral X-rays, magnetic and electric fields. The 3rd flight was carried out on Sep. 23-28, 1991 when the antarctic ozone hole was well developed, in order to investigate the chemical source and sink of ozone. PPB 4 and 5, with payloads of vector magnetic and electric fields and auroral X-rays, were launched on Dec. 26 and 30, 1992, respectively. PPB 6 aimed at studying the elemental and isotopic composition of galactic cosmic rays, solar energetic particles and cosmic gamma ray bursts, and was launched on Jan. 5, 1993. Results are discussed.

K-53134

Igarashi, K., Ohtaka, K., Kunitake, M., Tanaka, T., Ogawa, T., **Development of scanning-beam VHF auroral radar system. (Extended abstract),** NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.8, Tokyo, National Institute of Polar Research, Mar. 1995, p.65-69, 5 refs.

VHF radar observations at Showa Station have been made since 1966 as routine ionospheric observations. In order to cover the whole echo region, a new 50 MHz scanning-beam VHF auroral radar with two sets of array antennas was developed. This radar is capable of observing the whole region of radio auroral echoes which is generated by E-region irregularities. A plasma drift velocity map is available every several minutes. The aim is to conduct simultaneous observations with the HF radar which will be installed at Showa Station. It is possible to compare the E-region and F-region plasma drift velocities simultaneously. Four observation modes are available, including meteor echo observation mode.

K-53135

Ogawa, T., **Syowa Station MF radar experiment for studying the antarctic upper middle atmosphere: a proposal. (Extended abstract),** NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.8, Tokyo, National Institute of Polar Research, Mar. 1995, p.70-72, 10 refs.

The objective of the Showa Station MF radar experiment is to study the dynamics of the antarctic middle atmosphere (mean winds, tidal oscillations, planetary waves, and gravity waves); the D region electron density; the thermosphere-mesosphere coupling; the comparison of the antarctic middle atmosphere with the arctic middle atmosphere; and air circulation, tidal modes, planetary wave modes, and climatology of gravity waves on a global scale by participating in the worldwide atmospheric radar network.

K-53195

Kodama, M., Suzuki, H., Hirasima, Y., Yamagami, T., Murakami, H., Nishimura, J., **Circumpolar observation of bremsstrahlung X-rays by a polar patrol balloon over Antarctica,** *Journal of geomagnetism and geoelectricity,* 1995, 47(3), p.253-266, 29 refs.

This is a preliminary report of the first Polar Patrol Balloon (PPB) observation for auroral X-rays which occur widely in the south polar region. PPB No.6 was launched from Showa Station on Jan. 5, 1993, and flew one and a half circumpolar paths. Distinct enhancements of bremsstrahlung X-rays measured by an omnidirectional scintillation counter were often observed during the flight period of 27 days with low to moderate geomagnetic activity. Auroral X-ray enhancements observed at >65° invariant latitude show that their energy spectra progressively harden in the time interval from 6 to 18 h MLT. Time profiles of the enhancements are well characterized by the systematic E_0-flux relation, indicating that E_0s are held within a definite range during the enhancement; otherwise they vary, taking a minimum (or maximum) at the peak flux. This may suggest that two different modes of energetic electron precipitation are accompanied by stationary or variational spectra from onset to recovery of the enhancement. (Auth. mod.)

K-53200

Rees, D., Hernandez, G., Smith, R.W., **Thermospheric dynamics in the southern polar region,** *Advances in space research,* 1995, 16(5), p.3-15, 24 refs.

The dynamical behavior of the upper thermosphere in the southern polar region has been investigated for a range of solar and geomagnetic activity and as a function of season, using a series of simulations by a coupled thermosphere-ionosphere model. The predicted behavior in the southern winter period can be compared with recent ground-based Fabry-Perot interferometer observations of the OI ^{1}D emission from the Amundsen-Scott Station at the South Pole. (Auth.)

K-53201

Smith, R.W., Hernandez, G., **Upper thermospheric temperatures at South Pole,** *Advances in space research,* 1995, 16(5), p.31-39, 23 refs.

Six years of upper thermospheric temperatures measured using 630 nm emission in the vicinity of Amundsen-Scott Station have been analyzed both on a daily and hourly averaged basis to compare observed behavior with that predicted using the MSIS86 semi-empirical atmospheric model. Daily averaged temperatures are in good general agreement, but the response of the model to geomagnetic activity appears to be too weak to match the observed changes near the peak of the solar cycle. Observed diurnal temperature variations are very similar in amplitude and phase to those predicted by MSIS86. Observed mean temperature gradients indicate that the maximum temperature in the polar cap could well be 200K higher than the maximum seen at Amundsen-Scott Station and at a position geomagnetically higher in latitude. The highest observed temperatures are found on the geomagnetic nightside associated with the exit of the cross-polar thermospheric jet towards lower latitudes; the lowest temperatures are observed on the geomagnetic dayside in the region of inflow to the polar cap. No signature of cusp heating was found. (Auth. mod.)

K-53202

Conde, M., Dyson, P.L., **Thermospheric horizontal winds above Mawson, Antarctica,** *Advances in space research,* 1995, 16(5), p.41-52, 23 refs.

High-resolution (R=200,000) nighttime Fabry-Perot spectra of the 630 nm thermospheric airglow emission obtained from Mawson Station during the winter of 1992 have been used to provide estimates of thermospheric temperature and neutral wind. Horizontal winds observed on individual nights varied in a continuous manner between two limiting patterns. At one extreme the wind blew at all times in an anti-sunward direction across the pole. The other extreme had anti-sunward winds around magnetic midnight but sunward wind in the magnetic afternoon and evening sectors and, on some occasions, the morning sector as well. It is postulated that the relative strengths of the temperature gradient and ion drag forces determined where a given night fell in this continuum of patterns. Averaged winds from subsets of the data selected according to season and magnetic activity were used to examine the relative influences of these factors. The authors found solar activity variations to be stronger at higher levels of geomagnetic activity. Comparison with the VSH wind model was also made. (Auth. mod.)

K-53203

Scheer, J., **What can be learned from rotational temperatures derived from ground-based airglow observations about the aeronomy of the Southern Hemisphere,** *Advances in space research,* 1995, 16(5), p.61-69, 16 refs.

Ground-based measurements of rotational temperatures from the O_2 atmospheric and OH bands provide information about the dynamics of the upper atmosphere that is not easily accessible by other means. The spatial density of measuring stations of any kind, capable of determining temperatures in the 80-100 km altitude range, is quite low in the entire Southern Hemisphere, making airglow data very important. In Argentina, a tilting filter spectrometer has been in operation during a number of campaigns since 1984, giving temperatures of OH(6-2) at 86 km and of O_2(0-1) at 95 km with high temporal resolution (1.5 min). An overview of the results to date is presented. (Auth. mod.)

K-53204

Hernandez, G., Smith, R.W., Fraser, G.J., **Antarctic high-latitude mesospheric dynamics,** *Advances in space research,* 1995, 16(5), p.71-80, 14 refs.

The ground-based dynamical investigations of the mesosphere made at high austral latitudes from Amundsen-Scott Station and Scott Base are reviewed and discussed. The observations at these two locations show that atmospheric oscillations are reduced to zonal wavenumber zero and wavenumber one as the rotational pole is approached. These results have been theoretically explained as a natural extension of the solution of Laplace's Equation in the region near the rotational axis. The unambiguous confirmation of the theoretical results is possible because of the simultaneous measurement capability by the ground-based experiment of the wind field, kinetic temperature and emission rate. (Auth.)

K-53206

Von Biel, H.A., **Ground based radar investigation of the antarctic mesosphere,** *Advances in space research,* 1995, 16(5), p.91-98, 13 refs.

The operating principles and physical manifestation of a 2.9 MHz partial reflection program at Scott Base are described. Data from this program have been collected on an hourly basis since 1982, and these data have revealed that during the antarctic summer months (Nov. to Mar.), ionization appears to exist occasionally at a height of about 50 km. This phenomenon is observed about 20% of the time during these months. It is shown that this ionization might well have been produced by relativistic (about 1.5 to 4 MeV) electrons. (Auth.)

K-53207

Dyson, P.L., Parkinson, M.L., Quach, A.D., Smith, P.R., Monselesan, D.P., **Radio studies of the Southern Hemisphere high-latitude ionosphere,** *Advances in space research,* 1995, 16(5), p.103-112, 29 refs.

This paper is a brief review of the use of radio probing techniques being used in Antarctica. It is important to study the antarctic ionosphere in order to understand conjugate effects and the result of differences in north-south symmetry such as the greater offset between the geographic and geomagnetic poles which occurs in the Southern Hemisphere. The main radio techniques being used in Antarctica are HF auroral radars, digital ionosondes and satellite beacon observations. Current developments of the SHARE HF radar system, installation of additional digital ionosondes, and the installation of GPS receivers which can provide TEC data, will all provide significant advances in the study of the antarctic ionosphere. Observations of storm effects at sub-auroral latitudes, obtained using a digital ionosonde operating as an oblique HF radar, are presented. (Auth. mod.)

K-53208

Holzworth, R.H., Hu, H., **Global electrodynamics from superpressure balloons,** *Advances in space research,* 1995, 16(5), p.131-140, 33 refs.

Electric field and conductivity measurements in the stratosphere between Nov. 1992 and Mar. 1993 have been made using superpressure balloons in the Southern Hemisphere. Over 400 payload-days of data have been obtained during a record setting experiment called ELBBO (Extended Life Balloon Borne Observatories). This experiment resulted in 4 flights aloft simultaneously for over 2 months, including one flight which lasted over 4 months. Electrodynamical coupling between the atmosphere and ionosphere is studied using the measured electric fields and a simple empirical model of the stratospheric conductivity. Effects and dynamics of the global circuit suggest that standard models omit significant phenomena. Large-scale ionospheric convection activity has been studied from the polar cap to the middle latitudes. Cusp latitude fields have been continuously measured for many days in a row. (Auth. mod.)

K-53209

Morris, R.J., Monselesan, D.P., Klekociuk, A.R., **Australian antarctic middle and upper atmospheric physics: a new direction,** *Advances in space research,* 1995, 16(5), p.151-162, 21 refs.

The distribution of Australian antarctic stations provides a unique platform for remote sensing of the high-latitude middle and upper atmosphere. A recent national review on antarctic science has resulted in new priorities for Australia's antarctic physics program, with future research focussing on science of practical value or of relevance to global change. This paper presents a brief overview of the scope of that program, with emphasis on the recent deployment of a 'Digisonde Portable Sounder' (DPS-4) at Casey Station and a lidar to be commissioned at Davis Station. Preliminary results from the DPS-4 will be presented showing the behavior of the polar cap ionosphere over Casey, including diurnal and seasonal effects. Differences were observed in seasonal convection patterns and the implications of such variations are discussed in terms of convection models. Secondly, a high spectral resolution lidar system is under development for the detailed study of the middle and upper atmosphere above Davis Station. The lidar will routinely profile density, temperature, wind velocity and aerosol loading of the bulk atmosphere at high spatial and temporal resolution, for the assessment of climate change and the study of dynamical processes. (Auth.)

K-53224

Yamaguchi, T., Kunitake, M., **Radio observation data at Syowa Station, Antarctica during 1993,** *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1995, No.206, 190p.

Absorption of cosmic radio noise has been observed at Showa Station with a standard riometer at 30 MHz since Feb. 1966. This report presents data observed between Jan. 1 and Dec. 31, 1993. Besides the observed riometer data, other observation data are presented in the combined data plots for reference. These plots include geomagnetic field, HF, VLF, and radar observations. A bibliography relevant to riometer records of 30 MHz cosmic noise at Showa Station between 1967 and 1992 is included.

K-53226

Scientific Committee on Antarctic Research, **Report of the activities of the Solar Terrestrial and Astrophysical Research Working Group, SCAR XXII, Bariloche, Argentina, June 1992,** *STAR/PACA nesletter,* Dec. 1992, No.3, p.1-16.

The report contains summaries of the meeting activities, held in Bariloche, Argentina, June 8-12, 1992, including the workshop on Automatic Geophysical Observatories and AGONET, the Symposium on Antarctic Astronomy, the workshop on transients in the dayside auroral zone and cusp, the workshop on the effects of large magnetic storms, and two business sessions.

K-53227

Scientific Committee on Antarctic Research, **Scientific Committee for Antarctic Research Meeting in Bariloche, Argentina, June 1992. Solar Terrestrial and Astrophysical Research Working Group (STAR). Programme of activities,** *SCAR newsletter,* Feb. 1992, No.2, p.1-16.

The newsletter presents details of the program of activities to be carried out during the SCAR meeting of the Solar Terrestrial and Astrophysical Research Working Group (STAR), Bariloche, Argentina, June 8-12, 1992. Included are a workshop on Automatic Geophysical Observatories, a workshop on the proposed High Altitude Base, a STAR Business meeting, the Symposium on Antarctic Astronomy, a workshop on transients in auroral zone and cusp, and a workshop on effects of large magnetic storms.

K-53258

Sazhin, S.S., Bullough, K., **Theoretical studies of the inner magnetosphere based on whistler-mode wave data from the antarctic stations,** British Antarctic Survey Antarctic Special Topic Award Scheme Round 2 Symposium, Sep. 30-Oct. 1, 1992. Proceedings. University research in Antarctica, 1989-92, edited by R.B. Heywood, Cambridge, British Antarctic Survey, 1993, p.5-16, Refs. p.15-16.

A wide range of theoretical studies of whistler-mode waves observed at Faraday and Halley stations is presented with particular emphasis on the application of the results to diagnostics of parameters of the inner magnetosphere. It is pointed out that the nonlinear frequency shift in NAA and NSS signals observed at Faraday can be of the same order of magnitude or larger than the Doppler shift due to the movement of the magnetospheric ducts. This should be taken into account when interpreting the observed frequency shift and when using it for the diagnostics of the large scale electric field in the magnetosphere. The magnetospheric electron temperature is estimated by analysis of the upper branch of the nose whistlers. A model of hiss-triggered chorus emissions consistent with the results of observations is suggested. (Auth. mod.)

K-53309

Portniagin, IU.I., Forbes, J.M., Fraser, G.J., Vincent, R.A., Lysenko, I.A., Makarov, N.M., **Dynamics of the antarctic and arctic mesophere/lower thermosphere regions,** *Advances in space research,* Oct. 1992, 12(10), Earth's middle and upper atmosphere, edited by J.M. Forbes et al, p.(10)89-(10)96, 12 refs.

The dynamics of the antarctic and arctic mesopause regions (ca. 95 km) are investigated through comparative analyses of winds measured by radar at Scott Base, Molodezhnaya, and Mawson Stations in the Antarctic, and the near-conjugate stations of Heiss I. and Poker Flat in the Arctic. The data are analyzed specifically to delineate hemispheric differences in mean monthly prevailing and semidiurnal tidal wind climatologies, and show the circulation systems in the arctic and antarctic mesosphere and lower thermospheres to exhibit significant asymmetries and interannual variability. In addition, circulation patterns at nominal latitudes of 67 and 80° within a given hemisphere differ quite substantially, suggesting existence of a higher-latitude circulation system in addition to the well-documented middle latitude one that extends at least between 35-70° in each hemisphere. Existing empirical and numerical models are shown to be deficient in reproducing some salient characteristics of these high-latitude circulation systems. (Auth.)

K-53384

Balmforth, H.F., Moffett, R.J., Smith, A.J., Bailey, G.J., **Effect of disturbed-time electric fields on the inner plasmasphere,** *Annales geophysicae,* May 1994, 12(4), p.296-303, 27 refs.

Results from a mathematical model provide a description of the mid-latitude, low L-shell ionosphere and plasmasphere. Variations in the composition and dynamics of the plasmasphere and changes in the nature of the coupling between the plasmasphere and the ionosphere are studied for moderately disturbed conditions. Modelled results are compared to group delay and Doppler shift measurements of whistler mode signals at Faraday Station (L≈2.5), to investigate the effects of disturbed time electric fields on the inner plasmasphere and ionosphere. The disturbed time electric field causes a rapid outward drifting of the plasma leading to a decrease in modelled plasmaspheric electron density at a fixed L-value, which agrees with experimental observations. During the periods of outward drift, the modelled coupling flux is upwards to the plasmasphere which can lead to a significant depletion of N_mF2 values. (Auth.)

K-53385

Cartron, S., Vila, P., **Polar lacuna on ionograms. I: Brief morphology,** *Annales geophysicae,* May 1994, 12(4), p.355-358, 11 refs.

Causes of polar F lacuna, or complete disappearance of F layer traces on polar cap ionograms, are reexamined using data selected from thirty years of records at Dumont d'Urville Station (South Magnetic Pole invariant latitude L=-80.5). The nature and definition of the polar lacuna are reviewed. Constraints of the respective ionosonde equipment are evaluated and the reality of F2 lacuna is verified by high-resolution ionogram f-plots. Diurnal and seasonal characteristics of hourly lacuna occurrences are summarized for F1 and F2 lacunae and for type “F3”, F1 and F2 lacunae together. From the 60-s series at Dumont d'Urville, distinctive lifetimes and precursor phenomena for the three types are discussed. This evidence suggested a common origin for E and F layer lacunae. (Auth. mod.)

K-53388

Avery, S.K., Vincent, R.A., Phillips, A., Manson, A.H., Fraser, G.J., **High-latitude tidal behavior in the mesosphere and lower thermosphere,** *Journal of atmospheric and terrestrial physics,* July/Aug. 1989, 51(7/8), p.595-608, 18 refs.

DLC QC801.J6

The high-latitude structure of the mean winds and tides is described in this paper using climatologies prepared from radar data during the Atmospheric Tides Middle Atmosphere Program. The monthly evolution of the amplitude and phase of the tides is discussed. Comparison between the Southern and Northern Hemispheres indicate that the diurnal tide is stronger in the Southern Hemisphere and that the antisymmetric diurnal tidal modes are dominant. The semidiurnal tide is larger than the diurnal tide. The vertical wavelength structure is significantly different between the Southern and Northern Hemisphere. Comparisons with recent tidal models show several discrepancies. Antarctic stations providing observational radar data for this program include Mawson and Scott Base.

K-53389

Von Biel, H.A., **Geomagnetic time and position of a terrestrial station,** *Journal of atmospheric and terrestrial physics,* Sep. 1990, 52(9), p.687-694, 12 refs.

The concepts of geomagnetic time and position of a station on Earth are reviewed on the basis of the centered dipole, and the eccentric dipole, magnetic field approximations. Equations are presented from which the centered dipole coordinates can be computed as a special case of the eccentric dipole coordinates. It is also shown that several aspects relating to geomagnetism appear to vary nearly linearly with time and are well represented by linear regression equations which can significantly simplify subsequent computations. Sufficient information is included so that magnetic time and position for any station on Earth may be calculated. Sample results are presented which specifically relate to Scott Base, Antarctica. (Auth.)

K-53457

Rodger, A.S., Mende, S.B., Rosenberg, T.J., Baker, K.B., **Simultaneous optical and HF radar observations of the ionospheric cusp,** *Geophysical research letters,* Aug. 1, 1995, 22(15), p.2045-2048, 21 refs.

Simultaneous optical all-sky imager and photometer data from Amundsen-Scott Station and radar at Halley from two case studies are used to show that their respective ionospheric signatures of the magnetospheric cusp are collocated to better than about 1° latitude. The plasma convection reversal as identified in the Polar Anglo-American Conjugate Experiment data is usually observed within the region showing cusp precipitation, as expected from contemporary models of this region of geospace. (Auth.)

K-53556

Ermakov, V.I., Komotskov, A.V., **Measurement of high-energy particle concentrations in the tropical, middle and polar latitude stratosphere** [Rezul'taty izmerenii kontsentratsii zariazhennykh chastits v stratosfere tropicheskikh, srednikh i poliarnykh shirot], *Moscow. Tsentral'naia aerologicheskaia observatoriia. Trudy,* 1992, Vol.179, p.73-82, In Russian with English summary. 12 refs.

Results of balloon measurements of high-energy particle concentration by chambers of aspiration and ionization in the atmosphere, at latitudes between 81°N and 67°S during the period of 1988-90, are presented. The measurements were conducted in heliogeophysical situations without perturbation and during proton flashes on the Sun in cloudless and cloudy weather. It is experimentally determined that in the stratosphere a linear connection is observed between n and the intensity of cosmic rays, n=k I, where $k=1.3\ 10^3$/cm/s. (Auth.)

K-53578

Smith, D., **Stargazing at the South Pole,** *New scientist,* June 22, 1991, p.33-36.

The article describes telescopes and detectors to monitor solar oscillations, reflectors used to detect radiation produced by gamma rays, and other instruments used for astronomical research and experiments at Amundsen-Scott Station.

K-53579

Stoker, P.H., **Relativistic solar proton events,** *Space science reviews,* Aug. 1995, 73(3-4), p.327-385, Refs. p.381-385.

Ground level enhancements from solar flare protons have been recorded at SANAE Station since 1971 by two neutron monitors with different sensitivities to primary protons in the rigidity range from <1 GV to ≈5 GV. Spectral indexes of about 20 of these more energetic solar flare proton events have been determined from the two detector enhancements recorded at SANAE. These indexes do not show any increase (softening of the relativistic proton spectra) with increasing heliolongitude away from the preferred IMF connection region as was obtained for 20-80 MeV protons. Furthermore, most of the enhanced count rates show fluctuations larger than statistical, indicative of propagation in a mostly turbulent interplanetary magnetic field. (Auth. mod.)

K-53612

Besprozvannaia, A.S., Vovk, V.IA., Eliseev, A.IU., Lukashin, V.M., Moskvin, I.V., Khodzha-Akhmedov, Ch.L., **Peculiarities of the *F*2 MOF diurnal variations at the subauroral antarctic radio line Bellinsgauzen-Molodezhnaya,** *Geomagnetism and aeronomy,* Jan./Feb. 1994 (Pub. Aug. 94), 34(1), p.107-110, Translated from Geomagnetizm i aeronomiia. 13 refs.

This paper presents analysis of *F*2 MOF (maximum observed frequencies) diurnal variations at the subauroral radio line Bellingshausen-Molodezhnaya for winter and summer conditions of a high solar activity epoch. A comparison of *F*2 MOF experimental data with maximum applicable frequency magnitudes, which are calculated with a refraction integral method, was carried out. In the calculation the authors used the model of subauroral ionosphere developed for description of the atmosphere of the Southern Hemisphere. It is shown that the observed features of *F*2 MOF diurnal variations (an additional maximum in winter and a 180° turn of the maximum phase of *F*2 MOF diurnal variation when going from winter to summer) can be explained in terms of ionosphere peculiarities and of the conditions of radio wave propagation along the radio line. (Auth.)

K-53613

Vovk, V.IA., Egorova, L.V., Moskvin, I.V., **Evaluation of correlation between variations of absorption of cosmic noise and near-Earth atmospheric pressure in Antarctica,** *Geomagnetism and aeronomy,* Jan./Feb. 1994 (Pub. Aug. 94), 34(1), p.118-120, Translated from Geomagnetizm i aeronomiia. 7 refs.

Effects of the corpuscular and electromagnetic radiation of the sun on variations of near-earth atmospheric pressure from riometric data at stations in the polar cap and auroral zone are discussed. According to data from the stations at Vostok, Molodezhnaya and Mirnyy, a maximum of anticorrelation between the data of the riometric absorption and atmospheric pressure is observed in periods of proton flares at a shift of 12-60 hours. A minimum lag of the beginning of pressure variations is observed at Vostok Station at the beginning of the polar cap absorption event in the morning hours. This corresponds to the effects of solar cosmic rays (SCR) with a cutoff latitude of 80° and a particle energy of 10^6-10^7 eV over the polar cap region, and to variations caused by SCR in the atmosphere transparency and an abrupt pressure drop at latitudes of 80° immediately after the flare. (Auth.)

K-53661

Rasch, D.J., Essex, E., **Quasi-periodic scintillation events at southern auroral latitudes,** *Journal of atmospheric and terrestrial physics,* June 1994, 56(8), p.949-960, Refs. p.959-960.

Quasi-periodic (QP) radio scintillations were observed during 1987 on 244 MHz and 1.5 GHz geostationary satellite transmissions in the southern auroral zone from Davis Station. Three distinct types of QP events were identified, with occurrence times mainly restricted to the period 18-00 MLT. The substantial loss of signal associated with these events appears to be an important factor in determining the reliability of satellite links on 1.5 GHz in auroral regions. Previous observations at mid-latitudes of QP scintillations have noted a preference for large zenith angles and equatorward azimuths. It is demonstrated that a height transition in a densely ionized layer can produce QP scintillations in a manner analogous to a dense column of ionization but at lower ionization densities, as well as demonstrating a zenith angle and azimuthal dependence that is more consistent with observations than a column of ionization. (Auth.)

K-53663

Doolittle, J.H., Mende, S.B., Paschal, E.W., Trimpi, M.L., Anderson, M.R., **First automatic geophysical observatory installed on the polar plateau,** *Antarctic journal of the United States,* 1993, 28(5), p.301-302.

The first of six automatic geophysical observatories (AGOs) planned by the U.S. Antarctic Program was installed on the polar plateau in Dec. 1992. Located about 480 km from the South Pole, the AGO is an unmanned research facility that provides power, data acquisition, heat, and shelter as a host to experiments for investigating the high-latitude ionosphere and magnetosphere. When all six AGOs are deployed, a network of identical, synchronously operating experiments will give unprecedented ground-based coverage of the upper atmosphere in the polar cap.

K-53664

Weatherwax, A.T., LaBelle, J., Trimpi, M.L., Brittain, R., **Monitoring natural low-frequency/medium-frequency/high-frequency radio emissions from remote sites,** *Antarctic journal of the United States,* 1993, 28(5), p.303-305, 16 refs.

To gain a better understanding of auroral LF/MF/HF emissions, a ground-based effort has been started in Antarctica to study this part of the spectrum. Currently, radio receivers are being operated at Amundsen-Scott Station and at the first U.S. automatic geophysical observatory (AGO) site called P2. The South Pole receiver has been operating since the 1992 season, whereas the AGO receiver was deployed last year; AGO data should be available for analysis in winter 1993. Operation of the receivers in Antarctica not only will complement the work currently underway in the Northern Hemisphere (Alaska) but also should provide a lower noise environment for observations, since manmade interference should be minimal. A figure shows a block diagram of the Dartmouth LF/MF/HF receiver. Another figure shows 30 min. of data recorded on July 5, 1992, at Amundsen-Scott Station.

K-53665

Bersanelli, M., et al, **Absolute measurements of the cosmic microwave background from Amundsen-Scott South Pole Station,** *Antarctic journal of the United States,* 1993, 28(5), p.306-308, 12 refs.

Studies of the cosmic microwave background (CMB) were carried out during two antarctic expeditions, in Nov. and Dec. of 1989 and again in 1991, at the Amundsen-Scott Station. The accuracy of the measurements at frequencies below approximately 2.5 GHz is limited by the subtraction of galactic emission due to synchrotron and free-free radiation, a foreground signal that cannot be eliminated by the choice of observing site. The authors model the galactic contribution based on low-frequency maps scaled at the frequency and angular resolution of their instruments and test the model assumptions with differential scans. They are presently involved in a long-term effort to improve their knowledge of the galactic emission and spectral index, a step necessary for future improvement of low-frequency measurements of the CMB spectrum.

K-53666

De Amici, G., et al, **Low-frequency maps of the galactic radio emission,** *Antarctic journal of the United States,* 1993, 28(5), p.308-310, 4 refs.

The authors have performed an experiment in the operation and management of large equipment outdoors in the polar climate and have collected valuable information to use in the design and implementation of the next generation of receivers and instruments for mapping of galactic emission. Because the interfering signals have very narrow bandwidths, usually less than 2% of their receiver's, it is planned to use a correlator in the data acquisition. The correlator will subdivide the input signal into several narrow channels (approximately 40) and proportionally boost the effective amplitude of the narrow-band interference, making it easier to recognize and excise. This will increase confidence in the accurate subtraction of RF interference by a similar factor.

K-53667

Gaisser, T.K., et al, **Results from the South Pole air shower experiment,** *Antarctic journal of the United States,* 1993, 28(5), p.310-311, 3 refs.

The South Pole air shower experiment (SPASE) is operated jointly by the Bartol Research Institute of the University of Delaware and the Department of Physics of the University of Leeds, England. The air shower array consists of 24 1-m^2 scintillator detectors, 16 of which have timing capacity. The detectors are separated by approximately 30 m. The arrival times of the signals in the detectors define the direction of the cascade of particles produced when an energetic cosmic ray enters the atmosphere. The purpose of this experiment is to search for point sources of ultra-high-energy photons above the constant background of cosmic ray nuclei. The array has operated almost continuously since being deployed in the austral summer of 1987.

K-53668

Vinje, W., et al, **Neutrino detection with the radio-Cherenkov method: description and preliminary studies,** *Antarctic journal of the United States,* 1993, 28(5), p.311-314, 9 refs.

During the 1991-92 field season, the authors operated a prototype UHE neutrino detector, the antarctic radio-Cherenkov neutrino observatory (ARCNO), at the Amundsen-Scott Station. ARCNO was built to gain experience in using the "radio-Cherenkov" (RC) method of neutrino detection. The RC method is not yet widely known because only one other group has undertaken preliminary experiments (the radio antarctic muon and neutrino detector, RAMAND). The major neutrino detector currently under construction at the South Pole, the antarctic neutrino and muon detector array (AMANDA), does not use the RC method. Instead, AMANDA looks for the optical-Cherenkov (OC) signal using buried strings of photomultiplier tubes. The OC signal is much stronger than the RC signal; however, the OC signal can travel only short distances in ice (approximately 20 m).

K-53669

Bering, E.A., III, Benbrook, J.R., Chadwick, R., Byrne, G.J., Few, A.A., Morris, G.A., **Feasibility of long-term vertical electric current measurements in the Antarctic,** *Antarctic journal of the United States,* 1993, 28(5), p.314-317, 4 refs.

The authors have suggested that snapshot measurements of the electric potential of the ionosphere should be possible by making measurements of the vertical electric current at a network of manned and unmanned sites in Antarctica, including the U.S. automated geophysical observatories (AGOs). Implementation of this idea required a proof-of-concept test at the South Pole. Two concerns were posed. First, the effect of turbulence in the planetary boundary layer (PBL) on the proposed measurements was unknown. Second, new instruments might need some field-testing and development before being considered qualified for inclusion in the AGO environment. This paper reports on the experimental evaluation of these two concerns.

K-53670

Smith, R.W., Hernandez, G., Price, K., **Optical measurements of ion drift from South Pole Station,** *Antarctic journal of the United States,* 1993, 28(5), p.317-320, 13 refs.

Ion drifts and temperatures were measured by an optical method from Amundsen-Scott Station and compared with the neutral winds and temperatures simultaneously observed from the same station. Ion drift distributions showed that whereas there was no consistent trend in the magnetic meridional directions, a definite preference for westward ion drifts was observed. A similar trend was found for the zonal neutral winds, but the magnitude of the westward neutral trend was about half the magnitude for ions. The neutral vertical winds were much less variable than the ion velocities measured in the same direction. Ion and neutral temperatures had mean values of 1,152 K and 939 K, respectively, but unlike the result for neutral temperatures, there was a distinct tail to the distribution of ion temperatures toward high values. Evidence is presented that the ion and neutral data were measured at the same altitude in the F-region ionosphere; therefore, the authors conclude that the ions were 213 K hotter on average over the observing period.

K-53671

Clark, K.C., Hernandez, G., Schulz, W.J., Smith, R.W., **Optical all-sky viewing double dome for South Pole Station,** *Antarctic journal of the United States,* 1993, 28(5), p.320-323.

A full and clear view of the sky by optical instruments during the austral winter at the South Pole requires special attention to critical design features of the optical ports which protect the immediate components, such as all-sky mirrors, from the severe cold and associated frosting. An evolving system of double-domes and internal heating has successfully served the optical aeronomic studies of the dynamics of the upper atmosphere by Fabry-Perot spectrometry, which are now in their fifth continuous year. This protective optical port is described and discussed here to aid future experimenters who need to make dependable sky measurements under the extreme environmental conditions of the antarctic plateau.

K-53672

Arnoldy, R.L., Popecki, M.A., Engebretson, M.J., **Identifying the source of magnetic pulsations of frequency between 0.1 and 0.4 hertz (Pc 1/2) measured at high geomagnetic latitudes,** *Antarctic journal of the United States,* 1993, 28(5), p.323-325.

To determine what information is possibly contained in the high-frequency range of ultra-low-frequency (ULF) waves [greater than 0.1 hertz (Hz)], data from ground sensors located at Søndre Strømfjord in Greenland and at Amunsden-Scott and Siple stations were analyzed over a period of one year in spectrogram format to give the frequency character of the ULF signals from these sites. Søndre Strømfjord and Amundsen-Scott nominally sample the poleward border of the auroral oval or the cusp/cleft region on the dayside and are fairly conjugate within 2 hours of local time. Siple Station is a plasmapause station measuring ULF wave activity deep within the magnetosphere. Study results indicate that a large percentage of the high-frequency ULF waves measured at high latitudes do not reflect what is happening at the boundary of the magnetosphere but rather are generated deeper within the magnetosphere.

K-53673

Jefferies, S.M., Pomerantz, M.A., Duvall, T.L., Jr., Harvey, J.W., **Helioseismology from the South Pole: closer connections with geoseismology,** *Antarctic journal of the United States,* 1993, 28(5), p.328-329, 8 refs.

The Amundsen-Scott Station was used as a helioseismic observing site in 1981, 1987, 1988 and 1990-91. The data obtained have allowed the authors to study the mean structure, asphericity, and rotation of the solar interior and the variations of these quantities with the level of solar activity. The majority of the studies have concentrated on the standing-wave properties of the oscillations. Measurement of the traveling-wave properties, for example wave travel-times and distances, has not been explored. In geoseismology, travel-time measurement is fundamental to developing three-dimensional pictures of the underlying structure of localized regions of the Earth. Standing-wave or free-oscillation measurement generally provides information only on the global properties of the Earth.

K-53674

Bering, E.A., III, Benbrook, J.R., Lee, K., Clarady, C., Fujii, R., Kadokura, A., **Studies of ionospheric convection in the Southern Hemisphere using long-duration balloons,** *Antarctic journal of the United States,* 1993, 28(5), p.329-332, 7 refs.

The National Institute of Polar Research (NIPR), Japan, in collaboration with other institutions, has been conducting a series of long-duration balloon flights, called "polar patrol balloons" (PPB), since 1984 to study the ionosphere and magnetosphere above Antarctica. The authors have constructed and delivered two electric-field experiments that were flown on the payloads of two PPBs launched from Showa Station on Dec. 26 and 30, 1992. The first flight only lasted 8 days, but the second lasted considerably longer. Because of a failure in the telemetry encoder, data were not obtained after Jan. 13, 1993. It is concluded that the electric-field instruments functioned nominally throughout both flights, and the data appear to be of excellent quality; however, the analysis is still too preliminary to be reported here.

K-53708

Besprozvannaia, A.S., Shchuka, T.I., Troshichev, O.A., **IMF effects in the appearance of slant E conditions (SEC) in the northern and southern polar regions,** *Journal of atmospheric and terrestrial physics,* Aug. 10, 1995, 57(10), p.1179-1183, 14 refs.

Vertical sounding data of the polar ionosphere are used to study slant E condition (SEC) related to the development of instabilities in the ionospheric plasma. The measurements from three arctic and three antarctic stations located respectively in the polar cap, daytime cusp and auroral zone are analyzed. It is shown that the SEC daily variations in these three regions are different. Distinctions between SEC features in the opposite hemispheres are affected by the azimuthal and vertical interplanetary magnetic field components. (Auth.)

K-53722

Jones, G.O.L., Jarvis, M.J., **Springtime reduction in MF mesospheric echo occurrence,** *Geophysical research letters,* Aug. 15, 1995, 22(16), p.2123-2126, 19 refs.

Radar echoes from the upper mesosphere recorded by the dynasonde at Halley Station over four years have been studied to reveal the diurnal and seasonal characteristics of echo occurrence. In addition to the expected daily variation, a distinct seasonal change in the number and altitude of the echoes is apparent. The prevalence of echoes during the winter months is followed, in all four years studied, by a period during the antarctic spring when echo occurrence falls markedly for a period lasting for about three weeks. This dearth of echoes coincides with the breakdown of the polar vortex circulation pattern in the lower atmosphere, providing strong evidence of the neutral dynamical coupling between the stratosphere and mesosphere. (Auth.)

K-53809

Vennerstrøm, S., Friis-Christensen, E., Troshichev, O.A., Andresen, V.G., **Geomagnetic polar cap (PC) index 1975-1993,** Boulder, World Data Center A for Solar-Terrestrial Physics, 1994, 274p., Report UAG-103, 7 refs.

DLC QC833.G46

The first series of PC index values were published by WDC B in Moscow (See Troshichev et al., 1991), for the years 1975-1982. Here the authors present a reprint of this data series, together with a continuation for the years 1983-1993. PC is an index for magnetic activity in the (P)olar (C)ap. It is based on data from a single near-pole station, and is used to monitor the polar cap magnetic activity. This activity is generated by such solar wind parameters as the southward component of the interplanetary magnetic field (IMF), the azimuthal component of the IMF (B_y), and the solar wind velocity v. The station Thule, placed in the village Qaanaaq in Greenland at 86.5° geomagnetic invariant latitude, fulfills the requirement of being close to the magnetic pole in the Northern Hemisphere. The station Vostok does the same in the Southern Hemisphere. The PC index is derived independently for these two stations.

K-53832

Yang, S.F., Xiao, F.H., **Characteristics of Pi2 pulsations at the Great Wall Station in Antarctica,** *Chinese journal of geophysics,* 1994, 37(4), p.567-574, 8 refs.

In this paper, *Pi*2 pulsation events over the Great Wall Station in Antarctica are analyzed from Aug. 16 to Nov. 20, 1990. Their characteristics (occurrence frequency, frequency, and polarizations) are determined. The generation mechanism of *Pi*2 pulsations at the Great Wall Station is studied theoretically. (Auth. mod.)

K-53917

Saltus, R.W., Kucks, R.P., **Geomagnetic activity and its implications for the 1991-1992 CASERTZ aeromagnetic survey in Antarctica,** *American Geophysical Union. Antarctic Research Series,* 1995, 67(4), Contributions to antarctic research IV, p.9-17, 14 refs.

DLC G845.C67 vol.67, no.4, 1995

As part of aeromagnetic survey operations, the total field geomagnetic variation was recorded at the CASERTZ (Corridor Aerogeophysics of the South East Ross Transect Zone) base camp for 61 days from Nov. 16, 1991 to Jan. 16, 1992. This turned out to be a period of low worldwide geomagnetic activity. But, as is typical in Antarctica, geomagnetic variations exceeded 500 nT on noisier days. Comparison of the geomagnetic variation recorded simultaneously at several sites shows remarkably good agreement at distances of up to 200 km within the survey area, especially during magnetically quiet times. The design of the survey (5 km^2 flight grid) and a reduction technique combining removal of base station geomagnetic variation and adjustment of flightline intersections yields an aeromagnetic map accuracy of about 10 nT. (Auth.)

K-53937

Buckley, R.G., Trodahl, H.J., **Radiation risk,** *Nature,* July 5, 1990, 346(6279), p.24, 8 refs.

It has been pointed out earlier that antarctic life forms have developed only minimal defences against increased ultraviolet radiation as the ozone hole over the continent has persisted and deepened in recent years and penetrated the UV transparent sea ice cover. In this brief essay, the authors report measurements showing an even larger seasonal variation in the UV than in the visible spectrum. Algae which are known to be sensitive to UV radiation are put at greater risk of underproducing in these areas and thus induce a strain on the food web in ice covered regions.

K-53940

Cai, G., Geng, K., Wang, Q., **Environmental monitoring of the natural radiation background in Antarctica with LiF:Mg,Cu,P TLD and X-γ radiometry,** *Radiation protection dosimetry,* 1995, 60(3), p.259-262, 4 refs.

This paper describes the experimental results obtained with an X-γ radiometer and LiF:Mg,Cu,P thermoluminescence detectors for the measurement of natural radiation at Zhongshan Station. Two methods were adopted for the investigation: (1) thermoluminescence detectors for integrated dose; (2) X-γ radiometer (type BH3013) for the distribution of the dose rate. The experimental results show that the distribution of natural radiation levels in Antarctica is very uneven. Dose rates observed varied by a factor of 20. Further studies are needed to explain these results fully. (Auth. mod.)

K-53983

Smith, D.M., Lin, R.P., Anderson, K.A., Hurley, K., Johns, C.M., **High-resolution spectra of 20-300 keV hard X-rays from electron precipitation over Antarctica,** *Journal of geophysical research,* Oct. 1, 1995, 100(A10), p.19,675-19,685, Refs. p.19,684-19,685.

In Dec. 1990, a set of liquid-nitrogen-cooled germanium hard X-ray and gamma-ray spectrometers was flown aboard a high-altitude balloon from McMurdo Station for solar, astrophysical, and terrestrial observations. This flight was the first circumnavigation of the antarctic continent by a large balloon. Bremsstrahlung hard X-ray emission extending up to ca. 300 keV from the precipitation of high-energy electrons was observed on 6 separate occasions over the auroral zone, all during low geomagnetic activity. All events were consistent with emission at the trapping boundary; observations over the polar cap showed no precipitation. The authors present the first high-resolution spectra of this hard X-ray emission in the energy range 20-300 keV. The observed count spectra are deconvolved by model-independent techniques to photon spectra and then to the precipitating electron spectra. The spectral hardness shows an inverse relation with L as expected. Results suggest that high-resolution spectroscopy could be extremely effective in characterizing electron precipitation if coupled with imaging capability. (Auth. mod.)

K-53992

Kangas, J., Cao, C., **Pulsating aurora: a review,** *Antarctic research,* June 1995, 6(1), p.39-50, Refs. p.49-50.

The observational facts about pulsating aurorae are summarized and discussed in the frame of the recent development of theories which explain the mechanism of auroral pulsations. Although new data are available, some key observations in the magnetosphere are still missing in order to identify the wave mode to precipitate electrons into the atmosphere and in order to understand the role of magnetospheric plasma in producing pulsating aurorae. It appears that the Coroniti-Kennel or micropulsation theory needs to be re-visited, although the so-called flow cyclotron maser model seems to explain many of the characteristics of auroral pulsations. (Auth.)

K-54039

Troshichev, O.A., **Processes in the polar cap and magnetosphere in the presence of northern permafrost** [Protsessy v poliarnoĭ shapke i magnitosfere pri severnom MPP], *St. Petersburg. Arkticheskiĭ i antarkticheskiĭ nauchno-issledovatel'skiĭ institut. Trudy,* 1991, Vol.425, p.6-25, In Russian. 53 refs.

It is shown that processes in the polar cap in the presence of northern permafrost differ significantly from those that take place in the presence of southern permafrost. A critical review of a series of phenomenological models of the magnetosphere in northern permafrost is given. (Auth. mod.)

K-54040

Gizler, V.A., **Method of conducting observations with a digital component magnetometer at antarctic stations** [Metodika provedeniia nabliudeniĭ tsifrovym komponentnym magnitometrom na antarkticheskikh stantsiiakh], *St. Petersburg. Arkticheskiĭ i antarkticheskiĭ nauchno-issledovatel'skii institut. Trudy,* 1991, Vol.425, p.35-38, In Russian. 1 ref.

First tests of the digital component magnetometer under antarctic conditions proved it to be superior in comparison to the old generation instruments. It has the ability to measure all the components and the full vector of the field immediately, it is highly precise, and has a fast response. It can be used in observation as well as field stations. (Auth. mod.)

See also:
F-53196 G-51856 G-53232 G-53633 G-53636 I-52100 I-52503 I-52587 I-52802 I-53401 I-53405 I-53560

L. TERRESTRIAL PHYSICS

L-51662

Brozena, J.M., et al, **CASERTZ 1991-1992: airborne gravity and surface topography measurement,** *Antarctic journal of the United States,* 1993, 28(5), p.1-3, 16 refs.

CASERTZ (corridor aerogeophysics of the southeast Ross transect zone) is a multiyear program to study the geology, geophysics, and glaciology of the west antarctic rift system by means of data collected from an integrated airborne remote-sensing package installed on a Twin-Otter aircraft. The interior Ross embayment portion of the rift system was surveyed during the 1991-92 field season of the CASERTZ program. This article presents preliminary results of the airborne gravity and GPS positioning segments of the experiment, with a short discussion of the topographic mapping capabilities of the aircraft.

L-51663

Saltus, R.W., Kucks, R.P., **Geomagnetic activity and its implications for the 1991-1992 CASERTZ aeromagnetic survey in Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.3-4, 3 refs.

As part of aeromagnetic survey operations, the total field geomagnetic variation was recorded at the corridor of the southeast Ross transect zone (CASERTZ) base camp from Nov. 16 1991 to Jan. 16, 1992. This turned out to be a period of low worldwide geomagnetic activity, but as is typical in Antarctica, geomagnetic variation exceeded 500 nanoteslas (nT) on noisier days. Comparison of geomagnetic variation recorded simultaneously at several sites shows remarkably good agreement at distances of up to 200 km within the survey area, especially during magnetically quiet times. The design of the survey (5 km^2 flight grid) and a reduction technique combining removal of base station geomagnetic variation and adjustment of flightline intersections yield an aeromagnetic map accuracy of about 10 nT.

L-51667

Skov, M.J., Kyle, P.R., **Mount Erebus Volcano Observatory: seismic observations,** *Antarctic journal of the United States,* 1993, 28(5), p.13-14, 5 refs.

A permanent seismic network was established during the 1980-81 field season as part of the International Mount Erebus Seismic Study (IMESS). During the 1992-93 field season, major changes were made to the Mount Erebus seismic monitoring system. The network currently consists of six short-period vertical-component seismometers arranged in two triangles. One triangle is located around the summit region; the second, lower on the mountain. These stations employ very-high-frequency radio telemetry to transmit data to the recording system at McMurdo Station. A seventh station is temporarily located in McMurdo and is wired directly to the data logger.

L-51722

Kong, X.R., Zhang, J.J., **Deep electrical conductivity structure in the Great Wall Station area, Fildes Peninsula, West Antarctica,** *Antarctic research,* June 1994, 5(1), p.11-20, 5 refs. For Chinese original see 22L-49585.

In Dec. 1992, three sites for magnetotelluric (MT) measurements were selected in the Great Wall Station region. The Magnetotelluric Measurement Station MMSO2 system was used throughout the survey. Results show that the electrical conductivity major axis of Wind Valley Fault is around 110NE and the thickness of the crust in the Fildes Peninsula is about 22.3 km. The crust includes four main electrical conductivity layers with thickness of 1.3 km, 6.7 km, 1.2 km, and 13.1 km. The upper crust is 9.2 km and lower crust is 13.1 km. (Auth. mod.)

L-51735

Lu, C.C., **Connection measurement of gravity datum points at Zhongshan Station, Antarctica,** *Antarctic research (Chinese edition),* June 1994, 6(2), p.68-70, In Chinese with English summary. 7 refs.

In Dec. 1991, the connection measurement from international gravity point (IGSN71), Tasmania University to Zhongshan Station, was carried out using a Lacoste G gravimeter on the "Jidi" scientific investigation ship. The gravity difference between both points is 2154 mgal, and the gravity base point value obtained at Zhongshan Station is 982571.348 mgal. (Auth.)

L-51737

Roult, G., Rouland, D., **Antarctica I: Deep structure investigations inferred from seismology; a review,** *Physics of the earth and planetary interiors,* 1994, 84(1-4), p.15-32, Refs. p.30-32.

The strategic position of Antarctica and its role have always been seen as clues to the tectonic and geodynamic history of the Southern Hemisphere. Direct investigations are difficult, and seismology was, and still is, a very efficient tool for answering some important questions. Major seismological results from the beginning of the century to the present are reviewed, taking into consideration their limitations owing to the lack of stations and data. The existing regional Earth models reviewed are very simple because of poor processing facilities. The availability of high-quality data obtained with the GEOSCOPE network in this part of the Southern Hemisphere has recently led to the construction of maps of lateral heterogeneities of Antarctica with an improved resolution. A brief report of the authors' contribution is presented. (Auth.)

L-51738

Roult, G., Rouland, D., Montagner, J.P., **Antarctica II: Upper-mantle structure from velocities and anisotropy,** *Physics of the earth and planetary interiors,* 1994, 84(1-4), p.33-57, Refs. p.56-57.

To improve the lateral resolution of three-dimensional seismic wave velocity models in Antarctica and the surrounding oceans, the authors have analyzed direct earthquake-to-station Rayleigh-wave data observed on the vertical high-gain long-period and the very long period components of 7 GEOSCOPE stations located in the Southern Hemisphere and 3 other stations at equatorial latitudes. The phase velocities of Rayleigh waves along 400 well-distributed paths were obtained in the period range 60-300 s, by fitting the data with synthetic seismograms computed with known source parameters in a reference earth model represented by the Preliminary Reference Earth Model (PREM). The results show some new and important features of Antarctica and the Southern Hemisphere. The locations of velocity anomalies are well resolved. The eastern part of Antarctica corresponds to a craton-like structure down to depths of about 250 km, with the highest velocities observed in Enderby Land, where some of the oldest rocks in the world have been sampled. The low velocities are located along the ridges encircling the antarctic continent. The lowest velocities appear in some areas corresponding to hotspots (Crozet, Kerguelen, Macquarie and Balleny Is.). Also, an elongated low velocity is found on the western flank of the Transantarctic Mountains which might be related to the existence of a rift zone similar to the African rift. The Australia-Antarctica Discordance (AAD) presents low velocities near the surface but high velocities below the lithosphere. (Auth. mod.)

L-51746

Shu, P.Y., Zhang, B., **Crust-mantle structure under South Pole and Ross Sea beach in Antarctica,** *Antarctic research (Chinese edition),* Sep. 1994, 6(3), p.12-19, In Chinese with English summary. 12 refs.

A waveform comparison of theoretical seismograms with four teleseismograms recorded at Amundsen-Scott Station and at Scott Base shows that the crustal thickness beneath the South Pole is about 45 km, double layered structure, and that the crustal thickness below Ross Sea beach is single structure and about 24 km. At a depth of 350-450 km there is a low velocity layer. The above results indicate different tectonic characteristics on the two sides of the Transantarctic Mountains. (Auth. mod.)

L-51757

Geletti, R., Pipan, M., Vesnaver, A., **Signal/noise ratio enhancement of seismic profiles in the Ross Sea (Antarctica),** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.173-193, 3 refs.

Several seismic profiles by the OGS in the Ross Sea have been processed and interpreted. Attenuation of strong multiple reflections due to the frozen sea bottom and affecting the seismic records is the primary objective of this study. Various processing techniques were applied to improve the signal/noise ratio, such as weighted stack and iterated prestack *f-k* domain filtering; results obtained are reported and discussed. (Auth.)

L-51758

Galuppo, P., Geletti, R., **Seismic signal enhancement of antarctic crustal data,** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.195-202, Refs. p.201-202.

Most of the seismic data acquired in the Ross Sea are affected by a severe reverberation problem. The strongest reverberation energy comes from sea-bottom related multiple reflections. A simple CMP (Common Mid-Point) stack-based processing is not sufficient to overcome this problem. This is particularly true if the objective is deep reflectors. Therefore a reprocessing of some of the seismic line was done using specific, and in one case innovative, procedures. Application of the *f-k* domain multiple suppression method gave evidence of a deep reflection previously masked. The best result, however, came from the application of a new multiple suppression algorithm; reflections in general, and in particular those associated with the acoustic basement and the Moho discontinuity, were considerably improved. (Auth.)

L-51760

Gantar, C., Zanolla, C., **Gravity and magnetic exploration in the Ross Sea (Antarctica),** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.219-230, 8 refs.

Potential field data were measured during the Italian offshore exploration in the Ross Sea, using gravimeters and magnetometers. The results of the measurements taken during the first three cruises (1988-90) are presented as seismic line profiles and as bathymetric, free-air and simple Bouguer gravity anomaly maps. (Auth.)

L-51763

Gantar, C., **Ties to harbour bases for drift, scale and datum determination in antarctic marine gravity profiles,** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.265-289, 6 refs.

Gravity reference stations have been established in the harbors of Buenos Aires, Ushuaia, Punta Arenas, Wellington, Singapore, Hobart, Dunedin and Christchurch to provide gravity reference values and to compute the calibration factor and drift rate of the marine (surface) gravity meter employed during the first 4 polar expeditions by OGS, Trieste, in the period 1987-91. The expected gravity values in Antarctica (in the southernmost part of the Ross Sea) are 2 to 3 Gal greater than gravity values of the nearest gravity comparison bases in the harbors. Therefore, scale calibration uncertainties of the order of +/- 0.3 parts per 1000, which are considered acceptable in ordinary operations, would lead to systematic errors of the order of about 1 mGal for operations in the Ross Sea, due to extrapolation of the gravity values. To solve the problem it was decided to make suitable comparisons at harbors with gravity base values spread over the largest possible range during the ship's cruise around Antarctica. (Auth. mod.)

L-51765

Berger, P., et al, **Equipment and data acquisition techniques employed by the Italian geophysical exploration in Antarctica performed by OGS cruises 1987-88, 88-89 and 89-90,** *Bollettino di geofisica teorica ed applicata,* Mar.-June 1993, 35(137-138), Monograph on the Ross Sea Italian geophysical expeditions to Antarctica. Edited by I. Finetti and C. Roda, p.299-323.

During summers of 1987-1990, the OGS performed three geophysical surveys in the seas surrounding Antarctica. The exploration involved different areas in the Ross Sea, the South Pacific Ocean, Weddell Sea, Amundsen and Bellingshausen seas, the areas surrounding the Antarctic Peninsula and the South Atlantic Ocean. All the cruises were undertaken by the R/V *OGS Explora,* collecting seismic reflection, gravity, and magnetic data. During the second and third surveys, some seismic refraction profiles (using sonobuoys) were acquired in cooperation with the United States Geological Survey (USGS). The three campaigns produced a total of 16,923 km of seismic profiles and over 20,000 km of gravity and magnetic continuous recording. (Auth. mod.)

L-51781

Eittreim, S.L., **Transition from continental to oceanic crust on the Wilkes-Adelie margin of Antarctica,** *Journal of geophysical research,* Dec. 10, 1994, 99(B12), p.24,189-24,205, 48 refs.

The Wilkes-Adelie margin of East Antarctica, a passive margin rifted in the Early Cretaceous, has an unusually reflective Moho which can be traced seismically across the continent-ocean transition. Velocity models and depth sections were constructed from a combined set of U.S. and French multichannel seismic reflection lines to investigate the transition from continental to oceanic crust. These data show that the boundary between oldest oceanic crust and transitional continental crust is marked by a minimum in subsediment crustal thickness and, in places, by a shoaling of Moho. Three types of reflections in the seismic data are interpreted as volcanic deposits: high-amplitude reflections that floor the marginal rift basin, irregularly seaward dipping sequences that comprise an anomalously thick edge of oceanic crust, and highly irregular and diffractive reflections from oceanic crustal basalts that cap a normal-thickness ocean crust. The present depth to the prerift surface of continental crust is compatible with passive margin subsidence since 95 Ma, corrected for its load of synrift and postrift sediment and mechanically stretched by factors of B=1.8 or higher. (Auth. mod.)

L-51803

Tréhu, A., Behrendt, J.C., Fritsch, J., **Crustal structure of the central basin, Ross Sea, Antarctica,** *Antarctic journal of the United States,* 1993, 28(5), p.89-91, 10 refs.

The authors report that this study provides them with a detailed image of the lower crust beneath an extensional basin located within a large-scale continental rift zone. Assuming that the original crustal thickness beneath the Ross Sea was 30-40 km, the authors find the crust beneath the flanks of the central basin to be uniformly stretched by a factor of 1.5-2.0. The absence of a thick, high-velocity lower crustal layer beneath the flanks of the central basin suggests that significant extension occurred with only a small amount of melt generation. The balance among crustal thinning, volume of melt added, and postrift subsidence and sedimentation was such that the final crustal thickness is found to be approximately constant.

L-51865

Cunningham, W.D., Klepeis, K.A., Gose, W.A., Dalziel, I.W.D., **Patagonian orocline: new paleomagnetic data from the Andean magmatic arc in Tierra del Fuego, Chile,** *Journal of geophysical research,* Sep. 10, 1991, 96(B10), p.16,061-16,067, 44 refs.

The Hardy Formation is a 1300-m thick succession of Upper Jurassic-Lower Cretaceous volcaniclastic sedimentary rocks interbedded with lava flows on Hoste I. at the southernmost tip of South America. The strata are gently folded and metamorphosed to the prehnite-pumpellyite grade. A well-defined characteristic direction of magnetization, carried by magnetite, was readily identified in 95 samples from seven sites. It is most likely that the magnetization was acquired during the mid- to Late Cretaceous Andean orogeny that involved the folding and emplacement of the Patagonian Batholith. The fact that all samples are normally magnetized supports this age assignment. The pole position of 42.9N, 156.6E, implies that the sampling area has rotated counterclockwise relative to cratonic South America by 90.1 deg with no significant flattening of inclination (F=1.9). Geologic considerations indicate that the rotation involved the entire Andean magmatic arc in Tierra del Fuego. The results support interpretation of the Hardy Formation as part of the Andean magmatic arc deposited on the Pacific side of the Late Jurassic-Early Cretaceous Rocas Verdes marginal basin. Oroclinal bending of the arc in southernmost South America accompanied inversion of the marginal basin and the development of a Late Cretaceous-Cenozoic left-lateral transform system, South America-Antarctica, that later developed into the North Scotia Ridge. (Auth. mod.)

L-51926

Davey, F.J., **Bathymetry and gravity of the Ross Sea, Antarctica,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.357-358, 13 refs.

The main features of the bathymetry of the Ross Sea are shown in a figure, contoured at 100 m for the shelf area and at 500 m for the continental slope. Depths are corrected for sea water velocity variations. The seafloor of the Ross Sea lies at an average depth of about 500 m and deepens towards the Ross Ice Shelf. This deep, landward dipping continental shelf is thought to result from several factors: thermal subsidence of a sediment starved margin, flexural depression caused by the large deposits of prograding sediments at the shelf edge, ice erosions of the inner shelf, and depression by the nearby ice sheet. A gravity map shows the major gravity anomalies for the Ross Sea. The anomalies are referenced to the extensive OGS Explora 1988-91 datasets which are internally very consistent. Large anomalies and steep gravity gradients lie along the Transantarctic Mountains from Ross I. to Cape Washington.

L-51945

Kaminuma, K., **Seismic activity in and around the antarctic continent,** *Terra Antartica,* 1994, 1(2), Antarctic Offshore Acoustic Stratigraphy Project (ANTOSTRAT) Symposium, Siena, 1994. Antarctic continental margin: geophysical and geological stratigraphic records of Cenozoic glaciation, paleoenvironments, and sea-level change. Extended abstracts, p.423-426, 14 refs.

The antarctic continent and its surrounding southern ocean are divided into the following 5 regions in terms of seismicity: an intraplate low seismic region, high seismic region around the Antarctic Peninsula, antarctic continent aseismic region, low seismic region at the edge of the continent, and a volcanic region. A tripartite seismic array with three-component seismographs was operated around Showa Station in 1987-89 for studying the local seismicity around the station and the propagation characteristics of seismic waves under the east antarctic shield area. More than 17,000 events were recorded during 29 months from June 1987 to Oct. 1989; of these, about 25% were sea-ice shocks, 66% were icequakes, 8% were teleseisms and 1% were events caused by glacier movements. Only 10 local events were located by the network during the 20 months from June 1987 to Jan. 1989.

L-51965

Jankowski, J., ed, **Results of geomagnetic observations, Arctowski antarctic station, 1988-1989,** *Polish Academy of Sciences. Institute of Geophysics. Publications,* 1991, C-22(182), 107p., 5 refs.

DLC QC830.S75R47

This volume contains the results of observations of the Earth's magnetic field for the years 1988 and 1989 carried out at the Arctowski Station. A description of instruments for magnetic recording is given, along with the tabulated data which include the following: scale-values of magnetic variographs and adopted base values; three-hour range K indices, magnetic character figure C and magnetic phenomena; monthly and yearly mean values of magnetic elements; and mean hourly values for declination, horizontal intensity and vertical intensity.

L-52016

Kanao, M., Kaminuma, K., **Broad-band and wide dynamic-range seismic observations with an STS-seismograph at Syowa Station, East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.1-13, 26 refs.

Broadband and wide dynamic range seismic observations with a three-component Streckeisen seismometer (STS-1V, -1H) have been carried out at Showa Station since Apr. 1989. A digital acquisition system for broadband (BRB) velocity signals was started in May 1990, providing valuable data for the study of global seismology. In this paper, the seismic observations with STS obtained by the 33rd Japanese Antarctic Research Expedition from Feb. 1992 to Jan. 1993 are presented. The current observation system, hypocentral distribution of the detected events and some examples of recorded digital waveforms are also presented. A possibility of detecting a weak long-period signal, such as that of the free oscillation of the Earth, is also mentioned in relation to the observations with the superconducting gravimeter at Showa Station which have been carried out since Mar. 1993. (Auth. mod.)

L-52017

Hanada, H., Tsubokawa, T., **Absolute gravity measurements at Syowa Station: Results by the absolute gravimeter with a rotating vacuum pipe,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.14-22, 8 refs.

The authors measured absolute gravity values at Showa Station, which is one of the subsets A of the International Absolute Gravity Basestation Network (IAGBN), from Dec. 28, 1992 to Feb. 5, 1993. They used an absolute gravimeter with a rotating vacuum pipe (AGRVP) together with a transportable absolute gravimeter (No.2) of the National Astronomical Observatory, Mizusawa (NAOM#2). The results of the AGRVP gave two different solutions. According to comparisons with results by other absolute gravimeters at Showa Station, the Esashi Gravity Station of National Astronomical Observatory and Gravity Station of Geographical Survey Institute, the solution with a lower value seems to the authors to be reasonable. One possible cause for the difference between the two solutions is thought to be a misalignment of the falling object. (Auth. mod.)

L-52018

Kanao, M., Kamiyama, K., Ito, K., **Crustal density structure of the Mizuho Plateau, East Antarctica from gravity survey in 1992,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.23-36, Refs. p.34-36.

Gravity measurements with a LaCoste & Romberg gravity meter were conducted on the Mizuho Plateau along the traverse routes from Showa Station to Dome F by the 33rd Japanese Antarctic Research Expedition in 1992. Free-air and simple Bouguer gravity anomalies based on gravity disturbance along the traverse routes were obtained by use of both surface elevation data from GPS positioning and bedrock elevation from radio-echo sounding. A density model of crustal structure between Showa and Mizuho stations was derived on the basis of the *P*-wave velocity model from refraction explosion experiments in 1980 and 1981. The structure of the southern part of Mizuho Station was derived from gravity anomaly data alone. The simple Bouguer gravity anomaly was calculated by assuming the layered structure to fit the observed Bouguer anomaly. An increase of the Bouguer anomaly by about -200 mgal from Showa toward the Dome area indicates crustal thickening of about 40 to 48 km. The resultant Moho depth beneath the Dome area is greater than the average depth (40-45 km) in East Antarctica. (Auth.)

L-52019

Kudo, T., Nagao, T., **Evaluation of crustal structure and bedrock topography around Mizuho Plateau, Antarctica, based on gravity data,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.7, Tokyo, National Institute of Polar Research, 1994, p.37-48, 19 refs.

For the last three decades, gravity surveys around Showa Station have been conducted by the Japanese Antarctic Research Expedition. Especially in the vicinity of Mizuho Plateau, gravity data made it possible to analyze three-dimensional subsurface structures. The data have revealed several contradictions between gravity anomaly and ice thickness measured by radio echo sounding. To explain ice thickness data and gravity anomaly-bedrock height relations without any contradiction, about 5 g/

cm^3 of bedrock density is required; such high density is quite unnatural. In this study, the authors tried to construct the three-dimensional bedrock topography and shape of the Moho discontinuity by using gravity anomaly data. Through the analysis, they clarified the characteristics of the contradictions and found that ice thickness as determined by radio echo soundings is always less than the actual thickness by a constant factor. (Auth. mod.)

L-52088

West, B.P., Sempéré, J.C., Pyle, D.G., Morgan, J.P., Christie, D.M., **Evidence for variable upper mantle temperature and crustal thickness in and near the Australian-Antarctic Discordance,** *Earth and planetary science letters,* Dec. 1994, 128(3-4), p.135-153, 43 refs.

The Southeast Indian Ridge (SEIR) in and near the Australian-Antarctic Discordance (AAD) exhibits, at a constant spreading rate, almost the full range of the many geophysical and geochemical parameters characteristic of the 'slow' Mid-Atlantic Ridge and 'fast' East Pacific Rise. Satellite-derived gravity data, in combination with SeaMARC II bathymetry in and near the AAD, were used to examine regional density variations in the upper mantle beneath the AAD. Through three-dimensional gravity analysis, it was found that at least two end-member models satisfy the gravity observations: regional crustal thickness variations of at least 3 km along the SEIR near the AAD or a temperature anomaly of the order of 150°C in the upper mantle beneath the SEIR. These new observations, combined with other geophysical and geochemical characteristics of the Australian-Antarctic Discordance, provide further evidence that the temperature structure of a mid-ocean ridge is a controlling factor, in addition to spreading rate, in the crustal accretionary process. Numerical models of mantle flow beneath mid-ocean ridges offer one means of investigating the dynamic effect of a variable upper mantle temperature on the accretionary process. Results indicate that temperature is important, especially at intermediate and slower spreading rates, where thermal effects can dominate mantle flow beneath a mid-ocean ridge and result in increasing crustal production with decreasing spreading rate. At a constant intermediate spreading rate of 37 mm/yr, characteristic of the SEIR in and near the AAD, numerical models show that significant crustal thinning (2-4 km) can occur with relatively small variations in upper mantle temperature, all else being equal. Thus, combined with end-member gravity models, these observations and results suggest that both anomalously cool upper mantle and thin crust exist beneath the AAD. (Auth. mod.)

L-52213

Guterch, A., Grad, M., Janik, T., **Lithospheric structure in the region of Antarctic Peninsula from results of seismic investigations in West Antarctica,** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.67-77, 17 refs.

During 4 Polish Antarctic Geodynamical Expeditions (1979-1991) seismic experiments were performed in the transition zone between the Drake and South Shetland microplates and the antarctic plate in West Antarctica. The interpretation yielded models of the crust and lithosphere down to 80 km depth. The crustal structure beneath the trough of Bransfield Strait is highly anomalous. This inhomogeneity was interpreted as an intrusion, coinciding with the Deception-Bridgeman volcanic line. In the study area, the Moho boundary depth ranges from 10 km beneath the South Shetland Trench to 30-33 km in the South Shetland Is., 40-45 km under the coast of the Antarctic Peninsula, and about 45 km in the region of Anvers I. In the transition zone from the Drake Passage to the South Shetland Is., a seismic boundary in the lower lithosphere occurs at a depth ranging from 35 to 80 km. The dip of this boundary (as well as the Moho boundary) is about 25°, and indicates the direction of subduction of the lithosphere of the Drake plate under the antarctic plate. (Auth. mod.)

L-52214

Sroda, P., **Seismic modelling of the Earth's crust structure in the area of the Adelaide Island and Palmer Archipelago, West Antarctica,** Polar Symposium, 21st, Warsaw, Poland, Sep. 23-24, 1994. Sixty years of Polish research of Spitsbergen, edited by S.M. Zalewski, Warsaw, Polish Academy of Sciences, 1994, p.81-86.

In 1984-85 the second Polish Geodynamical Expedition to West Antarctica was organized to carry out seismic studies of the Earth's crust structure of the Antarctic Peninsula shelf between Adelaide I. and Palmer Archipelago, and to investigate the structures of the passive continental margin of the antarctic plate. In this report, results of 2-dimensional seismic modelling are described.

L-52223

Young, G.M., **Are Neoproterozoic glacial deposits preserved on the margins of Laurentia related to the fragmentation of two supercontinents?,** *Geology,* Feb. 1995, 23(2), p.153-156, 48 refs.

Remarkably similar deposits representing two Neoproterozoic glaciations are present on the west and east sides of Laurentia. Although now located near the margins of Laurentia, these glaciogenic successions were formed within supercontinents. The older glaciogenic succession (Rapitan-Sturtian, ca. 700 Ma) is preserved in a series of pull-apart basins formed when the supercontinent Kanatia fragmented to produce the proto-Pacific Ocean. The younger Varangerian glaciogenic rocks (ca. 600 Ma) are now scattered throughout the North Atlantic region, but formed in basins that reflect the demise of a second Neoproterozoic supercontinent (Rodinia) and heralded the formation of the Iapetus ocean. (Auth. mod.)

L-52224

Mortimer, N., et al, **Ferrar magmatic province rocks discovered in New Zealand: implications for Mesozoic Gondwana geology,** *Geology,* Feb. 1995, 23(2), p.185-188, 20 refs.

On the basis of similar ages, major and trace element concentrations, and Sr, Nd, and Pb isotopic ratios, the Kirwans Dolerite of western New Zealand are correlated with Jurassic low-Ti tholeiites of the well-known Ferrar magmatic province of Gondwana. Field relations and preliminary paleomagnetic data also support this correlation. Although the 1 km^2 Kirwans Dolerite is the first, and so far only, Ferrar correlative to be reported from New Zealand, it considerably increases the known shape and areal extent of the Ferrar province to close to the paleo-Gondwana margin. The presence of Ferrar rocks in New Zealand can be used to test several models of Ferrar magma genesis and Gondwana regional tectonics. (Auth. mod.)

L-52242

Lawver, L.A., **R/V *Nathaniel B. Palmer NBP*93-1 survey of the Antarctic Peninsula and Powell Basin,** *Antarctic journal of the United States,* 1993, 28(5), p.105-106, 3 refs.

Heat-flow, magnetics, gravity, and seismic reflection data as well as piston and gravity cores in Powell Basin were part of a study conducted on the *NBP*93-1 cruise of R/V *Nathaniel B. Palmer* to the Antarctic Peninsula. Because austral summer 1992-93 proved to be an exceptionally ice-free year for the east side of the Antarctic Peninsula, the authors took the opportunity to collect seismic, gravity, and magnetic data along the Larsen Ice Shelf to 66°45'S, an area previously unexplored. A total of 2,700 km of seismic reflection data was collected in Powell Basin. Heat-flow values indicate the general age of Powell Basin to be Oligocene. There are no correlatable magnetic anomalies from the basin, even though an extinct spreading center is identified from the seismic records.

L-52243

Sloan, B.J., Lawver, L.A., **R/V *Nathaniel B. Palmer NBP*93-1 cruise to the Larsen Ice Shelf region of the Antarctic Peninsula,** *Antarctic journal of the United States,* 1993, 28(5), p.107-108, 1 ref.

During the *NBP*93-1 cruise of R/V *Nathaniel B. Palmer,* exceptional ice conditions allowed the authors to explore the Larsen Ice Shelf region south of the Antarctic Circle, which had not been previously surveyed. They collected 2,000 km of underway geophysical data on the Larsen Ice Shelf including bathymetry, magnetics, gravity, and single-channel seismic-reflection data. Examination of the nine gravity cores and two piston cores, taken along two profiles that extend from the ice shelf to the upper slope, indicated a veneer of medium-soft olive-brown diamict several centimeters thick, which is underlain by a dark gray, firm diamict unit that proved difficult to penetrate. Both units include variable fractions of sand, pebbles, and cobbles interpreted as allochthonous ice-rafted debris.

L-52284

Kong, X.R., Zhang, J.J., Jiao, C.M., **Magnetotelluric deep sounding study in the region of Zhongshan Station, East Antarctica,** *Antarctic research (Chinese edition),* Dec. 1994, 6(4), p.32-36, In Chinese with English summary. 7 refs.

This paper presents the results of magnetotelluric observations in the region of Zhongshan Station which indicate that the lithospheric thickness of Larsemann Hills is 140 km, and that the crustal high conductivity layer is situated at 22 km. (Auth.)

L-52379

Bitterly, J., Schlich, R., Folques, J., Triniac, V., Braun, A., **Magnetic observations made at Port Alfred, Crozet Is., 1984** [Observations magnetiques faites à l'observatoire de Port Alfred, Crozet, 1984], Université de Paris VI. Institut de Physique du Globe, Strasbourg, 1986, 63p., In French. 5 refs.

DLC QC830.P823O27

Data collected at Port Alfred Observatory on Crozet are presented in tables. The hourly mean values for horizontal and vertical components and declination are given for 1984; mean hourly variations of the same parameters are included for every day, as well as mean monthly and annual values for 1975-1984, and secular variations for 1975-1984.

L-52380

Bitterly, J., Folques, J., Schlich, R., Le Foll, M., Metz, A., **Magnetic observations made at the Dumont d'Urville Observatory, Adélie Coast, 1986** [Observations magnétiques faites à l'Observatoire de Dumont d'Urville, Terre Adélie, 1986], Université de Paris VI. Institut de Physique du Globe, Strasbourg, 1988, 61p., In French with English summary. 6 refs.

DLC QC830.A3P37a

This report presents the results of geomagnetic measurements carried out at the French magnetic observatory at Dumont d'Urville during the year 1986. At Dumont d'Urville absolute measurements are made with an IPGS portable magnetometer theodolite with fluxgate sensor (X, Y, Z) and a proton precession magnetometer type GEOMETRICS G-816 (total intensity F). A three-component fluxgate variometer and a proton magnetometer are used to monitor the geomagnetic field variations. A low-power data logger (C-MOS technology) samples the field values at one-minute intervals. The data are recorded on magnetic tape or floppy disk and processed on a HP 1000 computer. Annual means, hourly means and one minute values for all the observed magnetic elements are supplied on magnetic tape and sent yearly to the World Data Centers for Geomagnetism. (Auth. mod.)

L-52431

Dibble, R.R., O'Brien, B., Rowe, C.A., **Velocity structure of Mount Erebus, Antarctica, and its lava lake,** *American Geophysical Union. Antarctic research series,* 1994, Vol.66, Volcanological and environmental studies of Mount Erebus, Antarctica. Edited by P.R. Kyle, p.1-16, Refs. p.15-16.

Mount Erebus contains an active phonolite lava lake in its summit crater which erupts in a strombolian fashion randomly each day. The velocity structure of the volcano has been studied using three seismic refraction lines up to 1.4 km long, six large seismic shots, and the frequent strombolian explosions recorded by video surveillance and a 10-station seismic net. The six large seismic shots were recorded over distances of 4 to 38 km. Seismic wave arrival times limit the surface layer thickness to between 220 and 650 m and the velocities to 1.3 to 3.1 km/s. The surface layer is underlain by 5 km of massive volcanics of a velocity of 4.3 km/s and in turn is assumed to be underlain by 3-5 km of Cenozoic sediments with velocity of 4.1-5.5 km/s. The stacked seismic onsets and video explosion instants are reliable to within 0.1 s, and the earthquake foci lie within 100 m of each other. They show that the explosions occur 0.47 s before the intercept time of the seismic time/distance curve and that the apparent velocity is 4.1 km/s over the distance range 0.7 to 10 km. The refraction lines show that a seismic delay of such magnitude is not occurring on the flanks of the volcano. It must occur in and around the low-velocity lava lake, magma column, and magma chamber of the volcano. (Auth. mod.)

L-52432

Dibble, R.R., **Velocity modeling in the erupting magma column of Mount Erebus, Antarctica,** *American Geophysical Union. Antarctic research series,* 1994, Vol.66, Volcanological and environmental studies of Mount Erebus, Antarctica. Edited by P.R. Kyle, p.17-33, Refs. p.32-33.

Television surveillance of explosions in the Mount Erebus lava lake has shown that explosions originate 0.5 s earlier than expected from the time-distance diagram of the accompanying earthquakes, assuming that the sources were at the explosion sites, the volcano is homogeneous, and the stacked seismograms of families of similar explosion earthquakes accurately define the seismic arrivals. Lava bombs show that the lava lake is vesicular, which markedly reduces the seismic velocity, and can cause the delay. The velocity structure in the vesicular lava column has been calculated using models of bubble growth in rising basaltic magmas with 0.5, 0.75 and 1% water and the theoretical acoustic velocity in bubbly liquids. The calculated velocities range from 20 m/s in surface magma with 50% vesicles, increasing with depth at up to 100 m/s/m to 2.3 km/s below the depth of nucleation. Ray path modeling shows that seismic rays originating in such media are curved strongly upward and have difficulty escaping into surrounding solid lava walls. (Auth. mod.)

L-52433

Kaminuma, K., **Seismic activity of Mount Erebus in 1981-1990,** *American Geophysical Union. Antarctic research series,* 1994, Vol.66, Volcanological and environmental studies of Mount Erebus, Antarctica. Edited by P.R. Kyle, p.35-50, 24 refs.

The seismic activity of Mount Erebus was monitored from Dec. 1980 until Dec. 1990. Seismicity during the period can be divided into four stages: high activity (Dec. 1980 to Sep. 1982), precursor to increased explosive activity (Oct. 1982 to Aug. 1984), increased explosive activity (Sep. to Dec. 1984), and low activity (1985-1990). From Dec. 1980 to Aug. 1984, the number of volcanic earthquakes around Erebus averaged 20-150 per day, including several earthquake swarms. A marked increase in volcanic activity which began on Sep. 13, 1984 and lasted until the end of Dec. 1984 had more frequent and larger strombolian explosions. This increased eruptive activity was accompanied by a distinct decrease in the intensity of background seismic activity, and only a few earthquakes per day were subsequently recorded. The number of seismic events during 1985-1990 averaged less than 20 per day, with only one or two earthquake swarms in 1985 and 1986. An aseismic zone in the southwestern part of Erebus attenuates the higher-frequency seismic waves and might indicate a magma reservoir which continuously supplies fresh magma to the lava lake in the Erebus crater. (Auth.)

L-52567

Kanao, M., Kaminuma, K., **Performance test of STS-seismograph in low temperature,** *Antarctic record,* 1994, 38(3), p.199-231, In Japanese with English summary. 26 refs.

Seismological observations by a set of three-component Streckeisen seismometers (STS-1V, -1H) have been carried out at Showa Station since Apr. 1989. Some problems have occurred during the deployment of the STS seismographs. First, there is a relationship between temperature change and the drift of POS (position) and LP (long period) outputs of STS. Second, pulse-like noises (referred to as 'shift-noises' in this paper) have been observed on the vertical component of a rapid change in temperature greater than 3°C/day or immediately after a large earthquake. In order to investigate the mechanism of occurrence of shift-noises, a simultaneous observation by two vertical sensors was conducted during JARE-33. It was revealed that the noises were generated by the behavior of the electric feedback circuit and/or of the leaf-spring of the vertical sensor under low temperature. It was found that there is a positive correlation between temperature change and drift; about 0.75 V/°C for the vertical component and 0.15 V/°C for the horizontal component. Shift noises similar to those at Showa Station were also observed in the low temperature laboratory experiment. (Auth. mod.)

L-52837

Bozzo, E., Caneva, G., Capponi, G., Colla, A., **Magnetic investigations of the junction between Wilson and Bowers terranes (northern Victoria Land, Antarctica),** *Antarctic science,* June 1995, 7(2), p.149-157, Refs. p.156-157.

A magnetic survey was carried out in the area between Lady Newnes Bay and Evans Névé (northern Victoria Land) to ascertain whether the contact between the Wilson and the Bowers terranes could be identified remotely. The survey consisted of 3 ground and 12 helicopter-borne profiles. The method was calibrated on the southernmost profiles, which cover a well-exposed section of the contact between the Wilson and Bowers terranes. The magnetic data and the 2.5-D modeling of three selected profiles indicate that no easily recognizable magnetic signature defines this contact. The main features of the area are magnetic anomalies probably controlled by the "Meander Intrusives" and the McMurdo volcanic rocks, both characterized by high susceptibility values. If an anomaly related to the contact exists, then it is probably masked by these stronger anomalies. (Auth.)

L-52988

Melchior, P., **Continuing discussion about the correlation of tidal gravity anomalies and heat flow densities,** *Physics of the Earth and planetary interiors,* Apr. 1995, 88(3-4), p.223-256, Refs. p.254-256.

On the basis of several objections, Rydelek et al. (hereafter denoted RZH) denied the existence of a correlation between residuals of tidal gravity (R) and heat flow (H) suggested by other workers. To re-examine the whole matter on safe grounds, the present author and his coworkers previously revised and reanalyzed all the original tidal data from 300 stations, taking care of the RZH objections by eliminating what they considered as the important sources of errors in the data, essentially calibration errors of the instruments in amplitude and phase. Using this new database, the author meets the other criticisms not related to the original tidal measurements and shows that most of them are not valid, in particular those concerning oceanic load and attraction corrections. A critical examination of the tides in the antarctic shows that the tidal residues observed at Amundsen-Scott Station are not due to imperfections in the world Schwiderski maps but rather to tides of the Ross and Ronne Ice Shelves which are not included in the Schwiderski maps. (Auth. mod.)

L-53022

Reitmayr, G., **Gravity map of Victoria Land, Antarctica,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.495-500, 14 refs.

More than 1,300 records of land gravity data, gathered during a series of expeditions to Victoria Land, in particular during the last four German GANOVEX expeditions, have been used to produce Free Air and Bouguer maps of this area. In addition to the conventional gravity corrections, the effects of ice cover had to be considered. Model calculations show that most of the lateral changes measured can be well explained by known details of topography and ice cover. Underneath the large glaciers, however, sea water or sedimentary troughs of substantial dimensions have to be assumed. (Auth.)

L-53023

Davey, F.J., Gantar, C., **Marine gravity measurements in the Ross Sea region,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.501-502, 8 refs.

A brief review is given of marine gravity measurements in the Ross Sea made between 1967 and 1990. A table shows the date, the ship, institute, track (in km), meter and base tie of each cruise. Level adjustments and self-consistency, maps and gravity modelling are discussed.

L-53024

Damaske, D., **Aeromagnetic surveys over the Transantarctic Mountains and the Ross Sea area,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.503-506, 13 refs.

Airborne investigations of the magnetic field in the Ross Sea region have been carried out since about 1960. During the last ten years about 90,000 km of data have been gathered at line spacings of 4.4 km (in most cases) with a tie-line interval of 22 km. Major structures in the Ross Embayment, such as the Victoria Land Basin and its central graben structure, have been magnetically identified and their extent determined. New features, e.g. the Polar 3 anomaly, have been discovered and are discussed in the context of the tectonic evolution in the Ross Sea area. Units of distinct magnetic signature and magnetic lineaments contributed to the understanding of the crustal structure of parts of the Ross Embayment. However, open questions remain regarding the boundary of the West Antarctic Rift System with the East Antarctic shield. (Auth. mod.)

L-53026

Behrendt, J.C., GANOVEX and CASERTZ Groups, **Marine magnetic and aeromagnetic surveys in the West Antarctic rift system,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.509-511, 19 refs.

Geophysical surveys over and adjacent to the Ross Sea continental shelf have revealed much information about the structure of the extended crust in this area of the volcanically active West Antarctic rift system (WR). The areas of the rift underlying the Byrd Subglacial basin are much less well known. Late Cenozoic rift activity, characterized by exposures of alkaline bimodal volcanic rocks along the flanks of the WR, has been dated from about 30 Ma to the present. A large mantle-plume-head origin has been proposed for the late Cenozoic rift activity in the WR on the basis of geophysical data and of ocean island basalt chemistry of the volcanic rocks.

L-53031

Delisle, G., **Measurement of terrestrial heat flow in glaciated terrain (preliminary data from Victoria Land, Antarctica),** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.527-528, 13 refs.

Heat flow measurements in the Ross Sea have shown consistently high values. The East Antarctic craton, on the other hand, is generally believed to be characterized by low heat flow values. The determination of the increase of terrestrial heat flow in the transitional zone between this craton and the Ross Sea could potentially help answer the two closely connected questions of the effect of the evolution of high crustal temperatures of the Western Ross Sea on the adjacent continental crust and of the cause of the ongoing uplift of the Transantarctic Mountains. An attempt to measure terrestrial heat flow in the onshore transitional zone was carried out during GANOVEX VII and is discussed in this paper.

L-53032

Della Vedova, B., Pellis, G., **Heat flow measurements in the Ross Sea area,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.529-530, 8 refs.

Evaluation of the heat flow density (HFD) in glaciated terrains or in marine areas by means of temperature and thermal conductivity measurements at shallow depth is difficult because of the rapidly changing boundary conditions at the surface. The first HFD determination in the Ross Sea area was performed on Ross I. in a shallow borehole at Arrival Heights, about 2 km north of McMurdo Station. The estimated heat flux value is 164±60 mW/m^2, or about three times the normal value. The HFD data set is heterogeneous and can only be used qualitatively for tectonic interpretation.

L-53033

Morelli, A., Amato, A., **Seismological contributions to a better knowledge of deep crustal and upper mantle structure beneath Antarctica,** *Terra Antartica,* 1994, 1(3), Special issue: Lithospheric Investigations in the Ross Sea Area (LIRA) Workshop, Gradisca d'Isonzo, June 3-5, 1993. Antarctic Offshore Acoustic Stratigraphy (ANTOSTRAT) Meeting, Gradisca d'Isonzo, May 31-June 2, 1993. Antarctic Crustal Profile (ACRUP). Data report. Crustal structure of the Transantarctic Mountains and adjacent Ross Sea depression. Ross Sea Regional Working Group. Geotraverse ACRUP-1 Experiment (1993-94). Edited by C.A. Ricci, p.531-532, 11 refs.

Seismological studies can provide unique information about the structure of the deep crust and upper mantle. The authors review three essentially different methods characterized by the use of different data and by different scales of application. Structural heterogeneities, such as those due to subducted slabs, continental roots, or thermal anomalies below rift or volcanic areas, induce anomalies in the velocity of seismic waves. These anomalies can be imaged using teleseismic recordings from an appropriate seismograph network. Tomographic techniques presented in the last 15 years or so have allowed identification of heterogeneities in the crust or in the upper mantle to a detail which varies with the general dimensions and density of the network.

L-53080

Conti, C.M., Rapalini, A.E., Vilas, J.F., **Palaeomagnetism of the Silurian Lipeón formation, NW Argentina, and the Gondwana apparent polar wander path,** *Geophysical journal international,* June 1995, 121(3), p.848-862, 69 refs.

A palaeomagnetic study was carried out on ferriferous beds of the Early Silurian Lipeón Formation in NW Argentina. Samples were collected at 19 sites in four different localities. Detailed thermal demagnetization has permitted the identification of three different magnetic components. All components are carried by haematite, as deduced from IRM curves and microscope analyses. Component A is interpreted to be of Recent origin, due to its coincidence with the geomagnetic dipole direction and its association with post-diagenetic platy haematite. Component B, with exclusive positive inclinations, was found in two out of four sampling localities. Its possible significance is discussed on the basis of an indeterminate result of the fold test and its correlation with the degree of deformation in the samples. The third isolated component (C) was present in the other two localities. It passed both fold and reversal tests and is clearly associated with oolitic haematite of early diagenetic origin. A palaeomagnetic pole of possible Early Silurian age was computed on the basis of mean site directions of component C. This new pole implies lower latitudes for Gondwana in the Silurian than were previously proposed and suggests a modification of the Gondwana apparent polar wander path. A reversed polarity option for the Early-Middle Palaeozoic path is suggested as a possible alternative. (Auth. mod.)

L-53093

Yao, B.C., Wang, G.Y., Chen, B.Y., Chen, S.Y., **Characteristics of geophysical field and tectonical evolution in the Bransfield Strait,** *Antarctic Research (Chinese edition),* Mar. 1995, 7(1), p.25-35, In Chinese with English summary. Refs. p.34-35.

Analysis of data collected in Bransfield Strait in 1991 is presented. The geomorphology, gravity and magnetic anomalies trend (NE direction) are recognized as bandings. The sediments in the Bransfield Strait are subdivided into two sequences: first rifting sequence and second rifting sequence. The basement is faulted into a half-graben faulting on the northwestern side of the Bransfield trough. Considering the crustal structure crossing the South Shetland Is., Bransfield Strait and the Antarctic Peninsula, the authors propose a two-phase rifting tectonic evolution model and a layered-shear model for the lithospheric deformation under the extensional stress field. (Auth.)

L-53139

Canals, M., et al, **Results of GEBRA '93 investigations in the Central Bransfield Basin** [La Cuenca Central de Bransfield (NW de la Península Antártica): primeros resultados de la campaña GEBRA '93], *Geogaceta,* Dec. 1994, No.16, p.122-125, In Spanish with English summary. 14 refs.

The GEBRA '93 (Geological Evolution of the Bransfield Basin) survey was carried out in Dec. 1993 in the Bransfield Strait and adjacent areas, on board the *BIO Hespérides.* The geophysical data acquired helped characterize the morphostructure, sediment cover and magnetic anomalies of the SW-NE trending Central Bransfield Basin. Some traverse shifts and thresholds, together with volcanic alignments along the basin, complicate the morphology and seismic structure of what otherwise would have been a long, continuous axial trough opened on a crust under extension. A major submarine valley has also been identified and named Gebra Valley. (Auth.)

L-53225

Okano, K., Kanao, M., **Seismological bulletin of Syowa Station, Antarctica, 1993,** *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1995, No.207, 95p., 5 refs.

The observation system at Showa Station is shown in a schematic diagram; the frequency response of the seismometers and epicenter locations of seismic events recorded at Showa Station are shown in graphs and charts; read-out data and a list of the 789 earthqakes detected are given in tables; and an appendix contains reproductions of seismic records.

L-53376

Scotese, C.R., Barrett, S.F., **Gondwana's movement over the South Pole during the Palaeozoic: evidence from lithological indicators of climate,** *Geological Society of London. Memoirs,* 1990, No.12, Palaeozoic palaeogeography and biogeography. Edited by W.S. McKerrow et al, p.75-85, 49 refs.

DLC QE501.4.P3 P27

A statistical technique is described that uses the geographical distribution of lithological indicators of climate (carbonates, evaporites, coals and tillites) to estimate the past position of the geographic pole. This technique was used to estimate the movement of the South Pole across the supercontinent of Gondwana during the Palaeozoic. Results indicate that during the Cambrian and Early Ordovician the South Pole was located adjacent to northwestern Africa. The pole moved into the Amazon Basin during the Late Ordovician and into south-central Argentina during the Silurian. Throughout the Devonian and Early Carboniferous the pole moved slowly from a location in southern Argentina to a position near the south coast of Africa. From the Late Carboniferous and into the Permian the South Pole swung eastward across central Antarctica. The Early Palaeozoic and Late Palaeozoic portions of the palaeoclimatically determined APW (apparent polar wander) path are in good agreement with available palaeomagnetic data. The Middle Palaeozoic portion of the palaeoclimatically determined APW path agrees better with the palaeomagnetic data that places the South Pole in southern Argentina, than with the palaeomagnetic results that place the Devonian pole in central Africa. (Auth.)

L-53378

Grunow, A.M., **Implications for Gondwana of new Ordovician**

paleomagnetic data from igneous rocks in southern Victoria Land, East Antarctica, *Journal of geophysical research,* July 10, 1995, 100(B7), p.12,589-12,603, 67 refs.

New paleomagnetic data presented here from the southern Victoria Land (SVL) region of East Antarctica further refine the Gondwana early Paleozoic apparent polar wander path. The results are based on paleomagnetic analyses of Early to Middle Ordovician granitoids and dike swarms from which a new SVL pole was calculated. The new SVL paleomagnetic pole agrees with less well-determined Ordovician poles from other parts of East Antarctica, indicating little or no translation/rotation across the East Antarctic craton since the Middle Ordovician. The new Gondwana 515 Ma and 475 Ma poles, when compared with poles of similar age from Laurentia, allow paleogeographic reconstructions to be made that are in keeping with models predicting that Iapetus Ocean basin opening and closure may have been related first to rifting and then collision of Laurentia with Gondwana. The paleomagnetic data also suggest that most of West Gondwana moved toward lower latitudes between the Middle/Late Cambrian and the late Early Ordovician, which may be reflected in the fossil record. (Auth. mod.)

L-53544

Shibuya, K., Dibble, R.R., Baba, M., Kyle, P.R., **Classification of volcanic earthquakes at Mount Erebus, Antarctica,** IAVCEI proceedings in volcanology. 1. Volcanic hazards: assessment and monitoring, edited by J.H. Latter, Berlin, Springer-Verlag, 1989, p.520-535, 13 refs.

DLC QE527.5.V65

On the basis of infrasonic and seismic waveforms, the authors classify volcanic earthquakes at Erebus volcano into Group I events accompanied by infrasonic signals of eruptions, and Group II without eruption signals. Groups I and II are connected by a hybrid type, which has a seismic signal of tremor type, and an infrasonic signal of β-type. Hence, there must be a transition in the generating mechanism from β- to hybrid to tremor type. Considering all types together, the dominant seismic frequency increases in a general way with reported focal depth, and a similar increase in the spectrum of the source time function is postulated. (Auth. mod.)

L-53545

Dibble, R.R., **Infrasonic recordings of Strombolian eruptions of Erebus, Antarctica, March-December 1984, covering the jump in activity on 13 September 1984,** IAVCEI proceedings in volcanology. 1. Volcanic hazards: assessment and monitoring, edited by J.H. Latter, Berlin, Springer-Verlag, 1989, p.536-553, 21 refs.

DLC QE527.5.V65

Continuous infrasonic recordings made at Windless Bight, 26 km from the summit crater of Erebus between Mar. and Dec. 1984, show an abrupt change both in the average interval between explosions and in the maximum infrasonic amplitudes on Sep. 13. Before the change the average interval was 2.8 days, and the maximum infrasonic amplitude was 6.3 mbar peak; afterwards the average interval was about 1.5 h, and the maximum amplitude on Sep. 17 was 32 mbar peak. From Sep. 13 to Dec. 8, when activity ceased for 13 days, about 1000 explosions occurred. The study demonstrates that independent monitoring of explosive eruptions by infrasonic arrays can determine explosion energy and minimum estimates of erupted gas volumes at nearby volcanoes. The other unique advantage is a superior far-field detection ability which offers the greatest potential for systematically reporting volcanic explosion energy worldwide. (Auth. mod.)

L-53569

Velasco, A.A., Ammon, C.J., Lay, T., **Source time function complexity of the great 1989 Macquarie Ridge earthquake,** *Journal of geophysical research,* Mar. 10, 1995, 100(B3), p.3,989-4,009, 45 refs.

The rupture process of the great 1989 Macquarie Ridge (M_w=8.1) strike-slip faulting earthquake is examined using an empirical Green function deconvolution method which provides broadband source time functions from both body and surface waves. Body wave deconvolutions indicate that the principal short-period (<30 s) moment release occurred in the first 25 s of rupture with no resolvable directivity; only minor short-period energy release occurred over the next 30 s. Surface wave deconvolutions for the usually neglected 20-150 s period range produce source time functions with slightly larger total moment than the body wave deconvolutions and no resolvable directivity from the onset to the peak of moment release in the first 20 s. Spectral inversions of long-period Love and Rayleigh waves indicate a centroid time shift of approximately 25 s in the period range of 150-280 s, compatible with the deconvolved surface wave source time functions. Deconvolutions using both empirical and theoretical Green functions are optimized to detect any long-period precursory radiation for periods up to about 250 s, but no convincing evidence for precursory radiation in the passband is found. (Auth. mod.)

L-53623

Henry, B., Plessard, C., **Geodynamical implications of new paleomagnetic data from Kerguelen Is.** [Implications géodynamiques de nouvelles données paléomagnétiques des îles Kerguelen (Océan Indien, France)], *Académie des sciences, Paris. Comptes rendus. Série II,* June 15, 1995, 320(12), p.1159-1162, In French with English summary. 21 refs.

A first significant palaeomagnetic pole for the Lower Miocene (22-20 Ma) of the Kerguelen Is. has been determined using data from 46 basaltic lava flows: 153.6°E, 84.2°N, A95=6.3°K=10.9. Since this period, the Kerguelen Is. have undergone clockwise rotation of about 10°. This rotation is related to drift of the whole of the stable Antarctica whose absolute position during Lower Miocene is now better defined. (Auth.)

L-53630

Storey, B.C., **Role of mantle plumes in continental breakup: case histories from Gondwanaland,** *Nature,* Sep. 28, 1995, 377(6547), p.301-308, 90 refs.

After thirty years of plate-tectonic theory, the reasons why supercontinents disintegrate and disperse to form smaller continental plates remain enigmatic. Possible causes range from abnormally hot mantle upwellings, or plumes, to changes in plate-boundary driving forces. The breakup of the Gondwanaland supercontinent, which started about 180 m.y.a., provides an excellent case history against which to test models. (Auth.)

L-53649

Lanyon, R., Crawford, A.J., Eggins, S.M., **Westward migration of Pacific Ocean upper mantle into the southern ocean region between Australia and Antarctica,** *Geology,* June 1995, 23(6), p.511-514, 26 refs.

The southern ocean south of the Great Australian Bight hosts a globally anomalous region of mid-ocean ridge, the Australian-Antarctic Discordance. In addition to its recognized morphological and geophysical anomalies, the discordance represents the current on-axis location of a proposed isotopic boundary between Indian Ocean and Pacific Ocean upper mantle convective regimes, previously defined from analyses of ≤4 Ma mid-ocean ridge basalts (MORB). Pb, Sr, and Nd isotope analyses of ca. 36-66 Ma seafloor dredged from either side of the northward extrapolation of the Australian-Antarctic Discordance show that ≥36 Ma seafloor to the east has an Indian Ocean MORB isotopic signature. This indicates that the Indian-Pacific isotopic boundary does not extend directly north of the ridge toward the southern margin of Australia. Progressive westward migration of an arcuate-shaped front of Pacific Ocean upper mantle therefore appears to be a consequence of Australian-Antarctic rifting and southern ocean opening, suggesting that the current location of the isotopic boundary within the discordance may be entirely coincidental. (Auth.)

L-53735

Small, C., **Observations of ridge-hotspot interactions in the southern ocean,** *Journal of geophysical research,* Sep. 10, 1995, 100(B9), p.17,931-17,946, 78 refs.

In this investigation, satellite-derived marine gravity data are used in conjunction with underway bathymetric and magnetic anomaly profiles to investigate the nature of ridge-hotspot interaction at four sparsely explored systems in the southern ocean. These systems illustrate three different stages of ridge-hotspot interaction in which a migrating spreading center approaches a hotspot (Pacific-Antarctic/Louisville), passes over or is captured by the hotspot (Mid-Atlantic/Shona-Discovery), and ultimately migrates away from the hotspot (Southeast Indian/Kerguelen). All of these systems show some evidence of discrete ridge jumps in the direction of the hotspot as the spreading center attempts to relocate toward the hotspot by asymmetric spreading. A simple model predicts that typical plume excess temperatures can weaken the lithosphere sufficiently to promote asymmetric spreading and possibly allow a discrete ridge jump. (Auth. mod.)

L-53916

Behrendt, J.C., McCafferty, A.E., Damaske, D., Kyle, P.R., **High amplitude aeromagnetic anomaly over the Butcher Ridge igneous complex: evidence of possible Jurassic cumulate rocks in the Transantarctic Mountains bordering the Ross Embayment,** *American Geophysical Union. Antarctic research series,* 1995, 67(4), Contributions to antarctic research IV, p.1-7, 21 refs.

DLC G845.C67 vol.67, no.4, 1995

A high amplitude magnetic anomaly occurs over the Butcher Ridge igneous complex in the Transantarctic Mountains. This sill-like body is approximately 10 km long where exposed. It ranges from basalt to rhyolite in composition and has been suggested as evidence of a large mafic intrusion at depth. A single NW-SE aeromagnetic profile flown across Butcher Ridge gave an 8-km wide positive anomaly with maxima of about 700 and 1000 nT which are associated with topographic peaks that the aircraft cleared at about 300 and 600 m respectively. The observed amplitude of the Butcher Ridge anomaly is too great to be caused by a typical sill of Ferrar Dolerite, examples of which are widely exposed along the Transantarctic Mountains. Model calculations show that the upper and most magnetic part of the inferred intrusion must be greater than about 2 km thick and that the entire intrusion is probably substantially thicker. The source of the Butcher Ridge magnetic anomaly is interpreted to be a layered mafic intrusion, syntectonic with the Jurassic Transantarctic (failed) rift, marked by the Ferrar Dolerite. (Auth. mod.)

L-53973

Hotten, R., **Palaeomagnetic studies on mafic dykes of the Shackleton Range, Antarctica, and their geotectonic relevance,** *Polarforschung,* 1995(Pub. 1993), 63(2/3), p.123-151, With German summary. 62 refs.

During the Geological Expedition to the Shackleton Range, Antarctica (GEISHA) in 1987-88, samples were taken from twenty-one basaltic dykes for palaeomagnetic investigations. The directions of characteristic remanent magnetization (ChRM) of the dykes were determined by thermal and alternating-field demagnetization of 268 cores drilled from the specimens collected. Moreover, on account of the hydrothermal and sometimes low-grade metamorphism of the dyke rock and the resulting partial modification of the primary magnetization, not only were comprehensive magnetic studies carried out, but also ore-microscopic examination. Jurassic and Silurian-Devonian ages were confirmed for the dykes of the northern and northwestern Shackleton Range. Radiometric ages were also determined for some of the dykes. Conclusions on the geotectonic relations of the Shackleton Range can also be drawn from the palaeomagnetic data. The pole positions for the Shackleton Range agree with those of rocks of the same age from other areas of East Antarctica. Its positions in the Palaeozoic-Mesozoic polar-wandering path for Gondwana are evidence against the idea of rotation and suggest rather that the position of the Shackleton Range crustal block is autochthonous. (Auth. mod.)

L-53980

Warner, R.D., Wasilewski, P.J., **Magnetic petrology of lower crust and upper mantle xenoliths from McMurdo Sound, Antarctica,** *Tectonophysics,* Sep. 15, 1995, 249(1-2), p.69-92, Refs. p.91-92.

A suite of xenoliths was collected from Ross I. in the McMurdo Sound area. The purpose of the study of these xenoliths was to determine the level of magnetization in lower crust and upper mantle lithologies and to discover the mineralogical basis for the magnetization records. Results show that the high geothermal gradient, characteristic of a continental rift setting, argues for about 12 km of magnetic crust before the Curie point is exceeded. The primary oxide of consequence in this rift environment appears to be ilmenite, which may be a common lower crust oxide mineral in this type of tectonic setting. No evidence was found in thermomagnetic experiments or in petrographic studies to suggest the presence of native iron. The secondary origin of much of the titanomagnetite now present suggests that unaltered, *in-situ* granulite lower crust in this area would be weakly magnetic even in a situation where the geothermal gradient was lower or where a tectonic reconfiguration would render the lower crust above the Curie geotherm. (Auth. mod.)

See also:
A-53513 C-51764 C-51810 C-51811 E-51664 E-51666 E-51671
E-51678 E-51679 E-51706 E-51752 E-51753 E-51754 E-51756
E-51759 E-51762 E-51802 E-51805 E-51809 E-51884 E-51890
E-51902 E-51903 E-51906 E-51907 E-51911 E-51919 E-51928
E-51932 E-51933 E-51936 E-52015 E-52104 E-52105 E-52115
E-52162 E-52222 E-52225 E-52240 E-52241 E-52347 E-52430
E-52434 E-52435 E-52442 E-52451 E-52474 E-52592 E-52795
E-52823 E-52846 E-52886 E-52887 E-53018 E-53019 E-53021
E-53025 E-53038 E-53039 E-53040 E-53321 E-53347 E-53452
E-53455 E-53543 E-53546 E-53561 E-53602 E-53603 E-53718
E-53742 E-53968 E-54017 E-54018 E-54019 F-52764 F-52917
F-52956 F-53491 I-52041 I-52089 I-52998 J-52622 J-52684
K-52286 K-52620 K-52976 K-52991 K-53673 K-53917

M. POLITICAL GEOGRAPHY

M-51827
Heap, J.A., ed, **Handbook of the Antarctic Treaty System. Eighth edition,** Washington, D.C., U.S. Department of State, 1994, 2300p.

This Handbook reproduces material related to the complex of arrangements comprising the Antarctic Treaty system, that is to say, the Antarctic Treaty itself, the Protocol on Environmental Protection to the Antarctic Treaty, 'measures (recommendations) in furtherance of the principles and objectives of the Treaty', and separate instruments dealing with seals and living resources. This edition of the Handbook has been rearranged to reflect the adoption and opening for signature in Madrid on Oct. 4, 1991 of the Protocol on Environmental Protection to the Antarctic Treaty. Part 1 contains General Measures relating to the operation of the Antarctic Treaty system, inspections under Treaty, exchanges of information and facilitation of scientific cooperation, as well as other components of the system covering the conservation of seals and other marine living resources and sections dealing with SCAR and COMNAP. It also includes material on the regulation of antarctic mineral resource activities. Although the Convection on that subject is not now likely to enter into force, it provides a number of precedents for later developments in the system. Part 2 contains material relating to the protection of the environment, including the Protocol and its five annexes. (Auth. mod.)

M-51980
Zou, K.Y., **China's antarctic policy and the Antarctic Treaty System,** *Ocean development and international law,* July-Sep. 1993, 24(3), p.237-255, 101 refs.

China began to express its interest in Antarctica in the early 1980s. China acceded to the Antarctic Treaty in 1983 and obtained consultative party status within the Antarctic Treaty System (ATS) two years later. Since 1984, China has been sending national scientific expeditions annually to the white continent and the surrounding seas. This article analyzes China's interests in and policy toward Antarctica as a whole by first discussing China's activities in Antarctica, its approaches to the Antarctic Treaty and its role in the ATS. It then explores the future trend of China's antarctic policy from political, economic, scientific, and environmental perspectives. The article concludes that with China's involvement in antarctic affairs, the vitality of the ATS has been further strengthened and Antarctica can better serve the interest of all mankind. (Auth.)

M-52065
Holdgate, M.W., **International designations,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.99-104.

A review of the systems of international designation is presented, and applications in Antarctica are considered. It is concluded that it would be most desirable for the designation of areas of environment subject to various special protection regimes in Antarctica to proceed on a basis, and using terms, as close as possible to those adopted in other regions of the world.

M-52066
Prebble, M., **Legal and policy issues,** SCAR/IUCN Workshop on Antarctic Protected Areas, Cambridge, U.K., 29 June-2 July 1992. Developing the Antarctic Protected Area System. Proceedings. Edited by R.I.L. Smith, D.W.H. Walton and P.R. Dingwall, Cambridge, U.K., IUCN—The World Conservation Union, 1994, p.105-109.

Adoption of the Protocol on Environmental Protection to the Antarctic Treaty in Madrid in 1991 and the completion of Annex V to the Protocol on Area Protection and Management, at the XVIth Antarctic Treaty Consultative Meeting (ATCM) in Bonn, Oct. 1991, provides the foundation of a new Antarctic Protected Area System. It now requires careful analysis and interpretation for effective implementation. This paper assesses the legal and policy issues associated with Antarctic Protected Areas. (Auth.)

M-52097
Blay, S.K.N., **New trends in the protection of the antarctic environment: the 1991 Madrid Protocol,** *American journal of international law,* Apr. 1992, 86(2), p.377-399, 78 refs.

The Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol) was approved in June 1991 and constitutes the most comprehensive treaty ever adopted on international environmental protection. The Madrid Protocol originated in the 1988 Convention for the Regulation of Antarctic Mineral Resource Activities (CRAMRA). CRAMRA was opposed by some governments because it permitted mining; the Madrid Protocol's ban on mining in Antarctica is the main difference between the two.

M-52454
Korotkevich, E.S., Slevich, S.V., Rogovtsev, A.N., **Antarctica as a nature reserve,** *Polar geography and geology,* Jan.-Mar. 1993, 17(1), p.79-84, Translated from Russkoe geograficheskoe obshchestvo. Izvestiia, Vol.124, No.3, 1992. 6 refs.

In terms of its ecology, the antarctic continent is unique. Perhaps the most crucial aspect is the delicate equilibrium existing among the flora, fauna, and the physical environment, an equilibrium which is extremely vulnerable to uncontrolled exploitation. Starting with the signing of the Antarctic Treaty in Dec. 1959, the authors trace the sequence of measures taken to safeguard the delicately balanced antarctic environment. They conclude that the signing of the Protocol on the Protection of the Environment in Madrid in 1991, which established a 50-year moratorium on mineral exploration or development, has made Antarctica the largest nature preserve in the world. (Auth.)

M-52668
Polar Research Board. Committee on Antarctic Policy and Science, **Science and stewardship in the Antarctic,** Washington, D.C., National Academy Press, 1993, 107p., Refs. p.85-86.
DLC G877.S35

At the request of the U.S. Department of State, the Polar Research Board of the National Research Council (NRC) established a Committee on Antarctic Policy and Science (CAPS) to evaluate the possible impacts of policy decisions on scientific programs in Antarctica. Following its initial meeting in 1992, the Committee convened a workshop to examine the governmental, environmental, and scientific issues raised by the Protocol. This report is the result of the Committee's deliberations; it consists of 5 chapters and 2 appendixes. The objectives of the report are: to outline the role of science in the stewardship of the Antarctic, and to describe the nature and characteristics of the governance process for the United States that will enable scientific investigations to contribute to that stewardship effectively. An Appendix considers tourism and includes guidelines for tourist conduct.

M-53001
Scapple, K., **Do international environmental policies really protect the environment? A framework for analyzing treaties,** Columbus, Ohio State University, 1994, 191p., University Microfilms order No. 94-27782, Ph.D. thesis. Refs. p.167-191.

A definition of environmental protection is created based on both contemporary and classical literature. This definition is used to analyze two international environmental treaties: the Montreal Protocol on Substances That Deplete the Ozone Layer, and the Convention for the Conservation of Antarctic Seals. The hypothesis is that a thorough treaty-making process tends to lead to higher levels of environmental protection. An analysis of the two cases indicates that there are challenges to this hypothesis. Organizations with global goals do not always draft treaties with higher levels of environmental protection. In fact, the participation of nongovernmental organizations may not always lead to high levels of environmental protection. In addition, an executive head with strong environmental commitments may not be necessary to the creation of good environmental policy. Rather, it appears that higher levels of environmental protection can be reached when the actors agree on both the problem and solution representations. The dissertation suggests that the two case studies did provide a good test of the analytical framework, but that additional case studies are warranted so that the hypotheses generated in this project can be tested. (Auth. mod.)

M-53175
Stokke, O.S., **Domestic politics and non-state actors in the Antarctic Treaty System: towards a framework,** *Fridtjof Nansen Institute. International Antarctic Regime Project. IARP publication series,* 1992, No.1, 19p., Refs. p.17-19.

The most important properties (variables) of domestic policy processes affecting antarctic politics are identified considering three levels of interaction: the domestic process of societal organizations trying to influence the foreign policy of a number of key antarctic states; the international process of these states grappling with the antarctic challenges; and the transnational process of societal organizations strengthening their ties to sister organizations in other countries to maximize their influence on the international deliberations of the Antarctic Treaty System. Seven steps are proposed to organize the analysis of environmental issues on the antarctic agenda.

M-53176
Joyner, C.C., **Role of domestic politics in making United States antarctic policy,** *Fridtjof Nansen Institute. International Antarctic Regime Project. IARP publication series,* 1992, No.2, 23p., 72 refs.

The main portion of this paper treats the general nature of domestic political influences on antarctic policy-making in the United States. A conceptual taxonomy for these chief domestic political forces is set out and the forces are assessed. The next substantive section examines the formulation and implementation of antarctic policy in the U.S. government. The roles of the executive and legislative branches, as well as various agencies in the U.S. government responsible for antarctic policy-making, are identified and analyzed, and organizational models depicting the U.S. antarctic policy-making process are suggested. A number of points about the domestic sources of U.S. antarctic policy are identified for critical reflection.

M-53177
Davis, B.W., Herr, R.A., **ATS decision-making and change: the role of domestic politics in Australia,** *Fridtjof Nansen Institute. International Antarctic Regime Project. IARP publication series,* 1992, No.3, 14p., Refs. p.11-14.

The manner in which Australia has conducted its relationship with the Antarctic Treaty System (ATS) in recent times is examined. The discussion covers Australia's role in Antarctica, the Australian political culture, the structure and process of Australian antarctic policy-making, its conservation movement, and the policy process in operation, from CRAMRA to the Madrid Protocol.

M-53178
Herr, R.A., Davis, B.W., **Antarctica and non-state actors: the question of legitimacy,** *Fridtjof Nansen Institute. International Antarctic Regime Project. IARP publication series,* 1992, No.4, 16p., 35 refs.

This paper addresses the question of the validity of non-state mechanisms in Antarctica, a region where the operation of sovereignty has been at least partially suspended. A distrust of sovereignty is linked to the role of non-governmental organizations (NGOs) in Antarctica; this connection is examined at the level of practical/working politics and at a theoretical level. The reciprocal interaction between the Antarctic Treaty System and interested NGOs is pointed out.

M-53179
Orrego Vicuña, F., **Protection of the antarctic environment,** *Fridtjof Nansen Institute. International Antarctic Regime Project. IARP publication series,* 1992, No.5, 44p., Refs. and notes p.30-44.

From the simplicity of the first recommendations of the Antarctic Treaty Consultative Parties relating to the impact of man on the antarctic environment, followed by the more specific problem of oil pollution, and arriving at current complex regimes for protection, a gradual extension of protection systems, and a significant development of its subject matter, is noted. This study emphasizes the main aspects of this evolution within the Antarctic Treaty, as well as the environmental criteria incorporated into resource regimes and into the preparation of comprehensive measures for environmental protection.

M-53228
Mielke, J.E., **Antarctic mineral resource activities: regulate or prohibit?,** *CRS review,* Nov.-Dec. 1990, 11(11-12), p.22-24.

Considering that Antarctica is under increasing scrutiny as a potential source of mineral resources, the author reviews this issue in the Antarctic Treaty framework and examines the likelihood of mineral deposits in Antarctica. A brief reference to the U.S. Congress action on the subject is made.

M-53291
Francioni, F., ed, **International environmental law for Antarctica,** Milan, Giuffrè Editore, 1992, 282p., Refs. passim. For individual papers see M-53292 through M-53303.

DLC KWX705.I57

This volume contains 12 papers, 6 of which were produced in a workshop on the legal issues involved in the protection of the antarctic environment, organized by the International Peace Studies Center of the University of Siena in 1990. The other 6 papers, prepared shortly after the adoption of the Madrid Protocol, consider the substantive and procedural norms introduced by the Protocol and its annexes and try to assess their impact on the Antarctic Treaty System and its relations with the body of international environmental law.

M-53292
Francioni, F., **Madrid Protocol on the protection of the antarctic environment,** International environmental law for Antarctica, edited by F. Francioni, Milan, Giuffrè Editore, 1992, p.1-30, 42 refs.

DLC KWX705.I57

An outline is presented of the various approaches to the environmental protection issue, debated in the course of several sessions of negotiations resulting in the adoption of the Madrid Protocol in 1991. An appraisal is made of the significance, efficacy and shortcomings of the norms contained in the Protocol, their relationship with the Antarctic Treaty System and the general principles of international law on the protection and conservation of areas not subject to the sovereignty of any nation.

M-53293
Watts, A., **Present antarctic system of environmental protection,** International environmental law for Antarctica, edited by F. Francioni, Milan, Giuffrè Editore, 1992, p.31-52, 30 refs.

DLC KWX705.I57

The legal framework for the protection of the antarctic environment is evaluated in the light of the provisions of the Antarctic Treaty, CCAS, CCAMLR, CRAMRA, and a review of non-antarctic treaties. It is found that the legal framework contains adequate mechanisms for securing improvements as and when they are needed; it is for governments to decide how and when to make use of these mechanisms.

M-53294
Manzoni, M., **Environmental hazards in Antarctica and man's impact on the antarctic environment,** International environmental law for Antarctica, edited by F. Francioni, Milan, Giuffrè Editore, 1992, p.53-92, 21 refs. and notes.

DLC KWX705.I57

The discussion addresses the question of the hostility of the antarctic nature to man and why antarctic nature needs protection. The impact of human activities in Antarctica is examined, including chemical, biological and radioactive contamination, exploitation of living resources and possible impact of mineral exploitation. The prerequisites for environmental protection are described and measures for its implementation, such as the EIA measures in the Antarctic Treaty System and those in the Madrid Protocol, are reviewed.

M-53295
Sohn, L.B., **Alternative strategies for the protection of the Antarctic,** International environmental law for Antarctica, edited by F. Francioni, Milan, Giuffrè Editore, 1992, p.93-112, 44 refs.
DLC KWX705.I57

The Antarctic Treaty provisions relevant to the protection of the antarctic environment are reviewed, and the related agreements and contentions of the Consultative Parties, expressed during the UN General Assembly sessions and at various international conferences, are discussed. The provisions of the CRAMRA document resulting from the Wellington Conference of 1988 are examined. Step-by-step recommendations are made to improve cooperation on environmental issues between the United Nations and the Antarctic Treaty Consultative Parties.

M-53296
Scovazzi, T., **Application of the Antarctic Treaty System to the protection of the antarctic marine environment,** International environmental law for Antarctica, edited by F. Francioni, Milan, Giuffrè Editore, 1992, p.113-134, 56 refs.
DLC KWX705.I57

A survey is made of the provisions of the present Antarctic Treaty System which are applicable to the protection of the antarctic marine environment, including the Antarctic Treaty, CCAS, CCAMLR, CRAMRA, and the Madrid Protocol. Recommendations of the Antarctic Treaty Consultative Parties regarding disposal of waste at sea, pollution from ships or from mining activities, and conservation of special areas are reviewed. In the concluding remarks, the Madrid Protocol is commended for being an instrument which deals extensively with the prevention of pollution of the antarctic ocean.

M-53297
Infante, M.T., **Applicability of maritime conventions to Antarctica,** International environmental law for Antarctica, edited by F. Francioni, Milan, Giuffrè Editore, 1992, p.135-148, 18 refs.
DLC KWX705.I57

To examine the applicability of the maritime conventions to the Antarctic Treaty area, a theoretical analysis is made of the main points of the Treaty and the law of the sea, with a general reference to the UN Convention of 1982. The analysis includes a discussion on the antarctic regime and the law of the sea, a review of old concepts and new realities in the law of the sea applicable to Antarctica, and the impact of the 1991 Madrid Protocol on marine environmental issues.

M-53298
Scovazzi, T., Pineschi, L., **Environmental impact assessment for scientific and logistic activities in Antarctica,** International environmental law for Antarctica, edited by F. Francioni, Milan, Giuffrè Editore, 1992, p.149-173, 46 refs.
DLC KWX705.I57

After providing a definition of the concept "environmental impact assessment" (EIA), an introduction of *ad hoc* regulations for EIA in Antarctica is made. The rules of the Antarctic Treaty System are presented in the light of the Antarctic Treaty Consultative Parties recommendations and the articles of the Madrid Protocol. A short survey of EIA procedures followed by nations active in Antarctica includes Argentina, Chile, Australia, Germany, France, Italy, New Zealand, Norway, the United Kingdom, and the United States.

M-53299
Pineschi, L., **Tourist activities and the protection of the antarctic environment: current obligations and possible future developments,** International environmental law for Antarctica, edited by F. Francioni, Milan, Giuffrè Editore, 1992, p.175-202, 87 refs.
DLC KWX705.I57

Reasons for concern about tourist activities in Antarctica, and the position of the ATCP on that issue reflected in their recommendations on regulating tourist activities, are discussed. The present legal regime, according to the Antarctic Treaty Recommendations, excludes tourists from Specially Protected Areas, the Specially Reserved Areas, and some new islands; certain restrictions are applied to marine areas. The new obligations provided for by the Madrid Protocol and its related annexes regarding tourism are examined, including prior environmental impact assessments, the assessment of impact on flora and fauna, waste management and disposal, prevention of marine pollution, and control. In the concluding discussion, some suggestions are made toward controlling tourism based on already existing regulations in other areas of environmental protection.

M-53300
Colella, A., **Legal nature of Antarctic Recommendations and their implementation in the domestic legal systems,** International environmental law for Antarctica, edited by F. Francioni, Milan, Giuffrè Editore, 1992, p.203-223, 41 refs.
DLC KWX705.I57

It is argued that the effectiveness of the measures established by the ATCP to protect the antarctic environment and regulate the impact of human activities largely depends on the legal strength of the Recommendations. To that end, the legal nature, or status, of the measures enacted by the Consultative Meetings of the Antarctic Treaty in pursuance of Article IX of the 1959 Treaty is defined, and the procedure by which the Antarctic Recommendations are implemented in the domestic legal systems of the Contracting Parties is examined. It is concluded that some countries consider the Recommendations merely as such, in that they express only a moral guideline and not a normative standard.

M-53301
Conforti, B., **Direct applicability in domestic law of recommendations adopted under Art. IX of the Antarctic Treaty: some comparative remarks,** International environmental law for Antarctica, edited by F. Francioni, Milan, Giuffrè Editore, 1992, p.225-231, 13 refs.
DLC KWX705.I57

An interpretation is proposed of the reasons why many nations, having ratified the Antarctic Treaty and given it validity within their legal systems, believe that the recommendations of Article IX of the Treaty could not become directly applicable without a legislative or administrative act to incorporate them into domestic law.

M-53302
Francioni, F., **International responsibility for damage to the antarctic environment,** International environmental law for Antarctica, edited by F. Francioni, Milan, Giuffrè Editore, 1992, p.233-257, 53 refs.
DLC KWX705.I57

This paper focuses on several legal issues related to the practical implementation of international responsibility for environmental damage in Antarctica. The discussion includes sources of environmental hazards, the applicability of a system of responsibility for environmental harm, conditions and standards of responsibility, and nature and scope of damage to the environment. The final question considers who may legitimately take unilateral or collective action to enforce responsibility for environmental damage in Antarctica.

M-53303
Sciso, E., **Are mineral resource activities still compatible with the protection of the antarctic environment?,** International environmental law for Antarctica, edited by F. Francioni, Milan, Giuffrè Editore, 1992, p.259-282, 44 refs.
DLC KWX705.I57

Two conflicting objectives, the exploitation of antarctic mineral resources and the protection and preservation of the environment, are examined in the light of the standards of environmental protection established by the 1988 Wellington Convention. It is concluded that, should the Convention become a valid regime for future mineral activities in Antarctica, it would be an inadequate legal regime if the objective of environmental protection is to be achieved.

M-53330
Angelini, J., Mansfield, A., **Call for U.S. ratification of the protocol on antarctic environment,** *Ecology law quarterly,* 1994, 21(1), p.163-241, 521 notes and refs.
DLC K5.C64

The Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol) creates a comprehensive regime for assessing environmental impacts, biological conservation, waste disposal, and marine pollution prevention in Antarctica. Although the U.S. signed the protocol, it cannot be ratified until implementing legislation has been enacted. The enactment of strong implementing legislation is advocated, because the U.S. maintains the largest population of antarctic scientists and tourists. The protocol differs from previous agreements in four important areas: more stringent environmental protection, regulation of all activity in the Antarctic, an exclusive focus on environmental protection, and a comprehensive approach to environmental protection. The areas of conflict in the debate on implementing legislation have focused on which regulatory agency should bear primary authority; the relationship between the implementing legislation and existing legislation; and whether the U.S. should exceed certain norms of the protocol. Recommendations are proposed for overcoming these problems.

M-53353
Kim, D.C., ed, Park, C.H., ed, Lee, S.H., ed, Paik, J.H., ed, **Maritime issues in the 1990s: Antarctica, law of the sea and marine environment,** Seoul, Yonsei University. Institute of East and West Studies, 1992, 228p., Refs. passim. For selected papers see M-53354 through M-53357.
DLC JX4419.M265

This volume grew out of the international conference on the three areas of interest indicated in the book's title, addressing issues such as the development and components of the Antarctic Treaty regime, the legal and political features of the antarctic regime, environmental issues and the regime's future prospects.

M-53354
Kim, D.C., **Introduction: Global cooperation in the 1990s: Antarctica, law of the sea and marine environment,** Maritime issues in the 1990s: Antarctica, law of the sea and marine environment. Edited by D.C. Kim, C.H. Park, S.H. Lee, and J.H. Paik, Seoul, Yonsei Univeristy. Institute of East and West Studies, 1992, p.xiii-xix.
DLC JX4419.M265

In this introduction to the book "Maritime issues in the 1990s..." the author argues that it is time to have a fresh look at the global issues related to the oceans, particularly Antarctica, its influence over major global systems, its role as a recorder of global environmental changes, and the Antarctic Treaty regime. In this light, the global ocean regime is examined, with a review of various UN conferences on the law of the sea.

M-53355
Lee, S.H., **Development and components of the Antarctic Treaty regime,** Maritime issues in the 1990s: Antarctica, law of the sea and marine environment. Edited by D.C. Kim, C.H. Park, S.H. Lee, and J.H. Paik, Seoul, Yonsei University. Institute of East and West Studies, 1992, p.3-16, 14 refs.
DLC JX4419.M265

The five principal components which comprise the Antarctic Treaty System (ATS)—the Antarctic Treaty, the Seals Convention, the CCAMLR, CRAMRA, and the Madrid Protocol—are described. The history of the development of the ATS is reviewed, and the challenge posed to it by many Third World nations, whose growing aspirations include regarding the Antarctic as part of the common heritage of mankind, is discussed. It is concluded that the regime seems to be able to overcome the challenge from the outside.

M-53356
Joyner, C.C., **Legal and political issues of the antarctic legal regime,** Maritime issues in the 1990s: Antarctica, law of the sea and marine environment. Edited by D.C. Kim, C.H. Park, S.H. Lee, and J.H. Paik, Seoul, Yonsei University. Institute of East and West Studies, 1992, p.17-42, 32 refs.
DLC JX4419.M265

In discussing the Antarctic Treaty System (ATS), which comprises the antarctic legal regime, three major issues holding political and legal significance are addressed: how necessary is an antarctic minerals regime, how comprehensive is antarctic environmental protection, and how best to manage antarctic marine living resources. A final discussion examines the negative and positive political and legal developments pertaining to Antarctica in the last three years, with the conclusion that only in a positive spirit of cooperation can the consultative parties ensure that the Antarctic Treaty will continue to benefit all mankind.

M-53357
Heap, J.A., **Environmental issues and future prospects of the antarctic regime,** Maritime issues in the 1990s: Antarctica, law of the sea and marine environment. Edited by D.C. Kim, C.H. Park, S.H. Lee, and J.H. Paik, Seoul, Yonsei University. Institute of East and West Studies, 1992, p.43-55, 3 refs.
DLC JX4419.M265

After review of some provisions of the Antarctic Treaty, the question of what has been achieved so far under the Antarctic Treaty Consultative Parties' custodianship of Antarctica is examined. The discussion is divided into five topics: conservation of wildlife, protected areas, protection of physical environment, exercise of forethought, and antarctic minerals. This is followed by a review and evaluation of the fundamental aspects of the Madrid Protocol and its Annexes. The conclusion is that the Protocol is both adequate for the job of protecting the environment and flexible enough to meet future requirements.

M-53419
Perrin de Richambaut, M., **New era of the Antarctic Treaty** [La nouvelle ère du traité sur l'Antarctique], *Acta geographica,* Feb. 1995, No.102, p.36-43, In French.

In reviewing the merits of the Antarctic Treaty, it is pointed out that it functioned very well between 1959 and 1982, at which time the first difficulties begun to surface. The Wellington Convention of 1988, the controversy among the consultative parties at the time of the signing of the Madrid Protocol and during the 16th and 17th Antarctic Treaty Consultative meetings, and how these difficulties were surmounted, are given as proof of the adaptive capabilities of the Antarctic Treaty System. It is concluded that the Treaty is irreplaceable and should not be altered.

M-53524
London. Foreign and Commonwealth Office. South Atlantic and Antarctic Department. Polar Regions Section, **Guide to Environmental Impact Assessment of Activities in Antarctica,** London, 1995, 11p., 6 refs.

The Madrid Protocol requires that activities in Antarctica be controlled so as to avoid damaging the environment, and provides for Environmental Impact Assessment (EIA) procedures for proposed activities. The United Kingdom has ratified the Protocol. The necessary changes to United Kingdom law have been made by the Antarctic Act 1994 (the Act) and the Antarctic Regulations 1995 (the Regulations). The aim of this guide is to provide: a description of the principles of the Environmental Protocol; a brief description of the main provisions of the Antarctic Act; details of the EIA procedures required by the Antarctic Regulations; and advice on best practice in carrying out EIA.

M-53531
International environmental law—the presumption against extraterritorial application of the National Environmental Policy Act: has the iron curtain been lifted?, *Land and water*

law review, 1994, 29(2), p.533-554, 178 refs.

DLC K12.A5

First, this casenote examines the issues concerning the extension of domestic law abroad. Second, it provides a general overview of NEPA (National Environmental Policy Act) and discusses the difficulty of interpreting NEPA's language. Third, the casenote considers the differing views regarding NEPA's extraterritorial application. Fourth, the casenote examines the federal judicial involvement with NEPA's extraterritorial application. Fifth, it explains the court of appeals' analysis in applying NEPA to federal agency action in Antarctica. The casenote further addresses the court's failure, in its narrow holding, to render a decision that clearly extends NEPA's application to all federal activities abroad. Finally, this casenote demonstrates that, despite the concerns raised by the Massey court's narrow holding, the combination of certain federal judicial decisions, legislative movement, and sociopolitical policy considerations favors the extraterritorial application of NEPA to all federal agency activities conducted overseas.

M-53558

Vidas, D., **Antarctic Treaty System and antarctic tourism: towards a legal regime?,** *International challenges,* 1994, 14(2), p.22-31, 1 ref.

The regulation of antarctic tourism has been in the focus of the Antarctic Treaty Consultative Parties (ATCPs) deliberations at several Consultative Meetings (ATCMs) over the past few years. It is the position recently taken by the ATCPs that the antarctic tourism regime already exists within the Antarctic Treaty System (ATS), and that it is merely a matter of its clear presentation to those addressed on how to implement such a regime. Another view is that a tourism regime is still a matter of an evolving process, which should ultimately result in a comprehensive regime suitable for regulating peculiarities of this specific human activity in the Antarctic.

M-53584

Andersen, R.M., **National Science Foundation strategy for compliance with environmental law in Antarctica,** Washington, D.C., U.S. National Science Foundation, 1989, 57p., 400 footnotes.

NSF and the Division of Polar Programs have implemented a number of programs in the last five years which have enhanced compliance with environmental laws governing antarctic operations. DPP also issued an Environmental Protection Agenda in Aug., 1988 that presented a plan to further remedy past mistakes and to prevent environmental harm from occurring in the future. This report recommends that additional actions be taken to bring NSF into full compliance with the law and to achieve sound environmental and conservation practices throughout Antarctica. It is suggested that NSF's Environmental Protection Agenda should now be revised to include the recommendations contained in this report.

M-53746

Wilder, M., **Settlement of disputes under the Protocol on Environmental Protection to the Antarctic Treaty,** *Polar record,* Oct. 1995, 31(179), p.399-408, Refs. p.407-408.

Since the Antarctic Treaty came into operation, antarctic affairs have been characterized by international cooperation. The major issues of potential conflict, namely sovereignty, military activity, and mining, have now been largely resolved. As a result, the remaining disagreements among parties have been resolved through consultation and negotiation. No dispute has ever found its way to judicial settlement, with most disagreements usually resolved at an early stage through ATCMs. While there is no reason to suspect that the use of consultation and negotiation will not continue, with the introduction of far more comprehensive measures for the protection of the antarctic environment, combined with the significant increase in activity in and around the continent, there is a greater likelihood of situations occurring that clearly breach these principles or give rise to a dispute. In addition, where extensive damage to the environment has already occurred, negotiation may be limited, so that other mechanisms for settling disputes must be instituted. The dispute procedures of the Protocol, taken almost entirely from CRAMRA, represent the most comprehensive system for the peaceful settlement of disputes arising in any antarctic instrument to date. (Auth. mod.)

M-53984

Joyner, C.C., **Fragile ecosystems: preclusive restoration in the Antarctic,** *Natural resources journal,* Fall 1994, 34(4), Special issue: The international law of ecological restoration, p.879-903, 91 refs.

DLC K14.A868

The Antarctic is a pristine frozen wasteland and a delicate ecosystem. To preserve and protect this region, certain states have committed themselves to a legal regime that performs "preclusive restoration." This regime pursues a purposeful strategy that aims at revitalization and restoration of the antarctic environment by implementing norms to prevent degradation and depletion of the antarctic ecosystem and its resources. A series of international agreements have been carefully crafted by these states to implement this strategy. Thus far, preclusive restoration has operated successfully. It is protecting and conserving antarctic flora and fauna, seals and other living marine resources in the circumpolar seas, and the antarctic environment in general. Most recently, preclusive restoration has been evidenced in the rejection of a negotiated antarctic minerals regime, a 50-year ban placed on the exploitation of mineral and hydrocarbon resources in the region, and the adoption of measures to control marine pollution, manage waste disposal, furnish environmental impact statements, and protect special areas. (Auth.)

M-53986

Joyner, C.C., Ewing, B.G., Jr., **Antarctica and the Latin American states: the interplay of law, geopolitics and environmental priorities,** *Georgetown international environmental law review,* 1991, 4(1), p.1-46, 230 refs.

DLC K7.E642

The principal aim of this article is to examine how Latin American national interests and geopolitical perspectives have contributed to the development of the present Antarctic Treaty regime, highlighting implications for the circumpolar environment. Accordingly, this article examines the evolution of key Latin American states' policies and their impacts on the present antarctic legal regime. The study also considers various political and legal effects of the treaty system on individual state behavior relating to contemporary environmental priorities in the Antarctic. The main thrust here is to assess how environmental considerations square with current Latin American geopolitical priorities. Finally, some conclusions on the future course of Latin American geopolitical concerns vis-à-vis the antarctic environment are suggested for critical reflection.

M-53987

Bederman, D.J., **Antarctic and Southern Ocean Coalition's Convention on Antarctic Conservation,** *Georgetown international environmental law review,* 1991, 4(1), p.47-149, 110 refs.

DLC K7.E642

The Antarctic and Southern Ocean Coalition (ASOC) is a non-profit organization including more than two hundred conservation and environmental groups in forty-nine countries around the world. To promote a stronger conservation regime in the antarctic region, ASOC assembled a team of international lawyers and environmental experts to draft a Convention on Antarctic Conservation. The purpose of this project was to develop an illustrative, comprehensive regime for the protection and preservation of the antarctic environment. Full texts of the ASOC's Convention on Antarctic Conservation, and of the Protocol on Environmental Protection to the Antarctic Treaty, follow this commentary which offers a comparison of the main features of both.

M-53988

Mottesi, M.A., ***Foley* Doctrine revisited: application of the Resource Conservation and Recovery Act of 1976 in Antarctica,** *Georgetown international environmental law review,* 1991, 4(1), p.229-244, 87 refs.

DLC K7.E642

This article examines whether the National Science Foundation (NSF) is required to abide by the Resource Conservation and Recovery Act (RCRA) guidelines in its projects carried out in Antarctica. Since Antarctica is not part of the territorial United States, any suit brought against NSF for violating RCRA would require an examination of the extraterritorial reach of this statute. Part I of the article briefly explains the Antarctic Treaty regime and how it might affect this issue. Part II discusses the international law principles that allow the U.S. Congress to give statutes extraterritorial reach. Part III considers the *Foley* Doctrine, which stands for the principle that, unless otherwise indicated, statutes enacted by the U.S. Congress are presumed to apply only within the territorial United States. The author concludes that RCRA does not apply in Antarctica, because it lacks explicit extraterritorial language and therefore does not overcome the *Foley* presumption.

See also:
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Charadriiformes
See: Aves-Charadriiformes
Charts
See: Maps and charts
Chemistry
See: Biochemistry; Geochemistry. *Also used as subordinate term*
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Cold effects
See: Low temperature effects

Communication
See: HF communication; Radio communication

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- Concordia Station [1994, eng] **G-53435**
- Restoration of the Swedish hut in Hope Bay [1994, spa] **A-51744**
- *Also used as subordinate term under various types of ice (snow)*
- BUILDING
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  - Numerical model of blowing snow around an antarctic building [1994, eng] **F-52941**
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Also used as subordinate term under various types of ice (snow)

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See under: Atmosphere. *Also used as subordinate term under various types of ice (snow)*

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